

**Senior Leader Decision Making:
Lessons Gleaned from
Field Marshal Viscount Sir William Slim and Bill Gates**

**A Monograph
by
Lieutenant Colonel Keith Vore
Infantry**

**School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas**

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Lieutenant Colonel Keith Vore

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Approved by:

James Schneider, Ph.D. Monograph Director

COL Robin Swan, MMAS Director, School of Advanced
Military Studies

Phillip J. Brookes, Ph.D. Director, Graduate Degree
Program

Accepted this day of 2000

Abstract

Senior Leader Decision Making: Lessons Gleaned from Field Marshal Viscount Sir William Slim and Bill Gates, by LTC Keith Vore, USA, 67 pages.

Just as many football players have failed to become great coaches, so too have many governmental leaders, leaders of industry and military officers failed to succeed when placed at higher levels of responsibility. Understanding *how* to solve problems at increasingly higher levels of dynamic complexity is certainly important to the success of the military at large. Being able to discern a complex situation, sizing up what is happening and what is critical to the situation, knowing at a glance what is occurring and why, confidently understanding what is important (and what is *not*), and then making a successful decision to respond are critical aspects of senior leader decision making. Resources at this level are rarely sufficient to overwhelm the opposition everywhere continuously. Divining a “path of success” that maximizes leverage over the competition at least cost is imperative for long-term operations.

One way to explore this vital issue is to examine the thoughts and decisions of those who *have* been thrust into complex decision making situations and were eminently successful, time and again. Sir William Slim faced almost insurmountable complexity in dealing with the Japanese in the China-Burma-India theater during World War II. Yet he managed to figure out a way to succeed in spite of the complexity he faced, soundly defeating the Japanese and driving them completely from the country. Bill Gates has faced complexity of an entirely different sort in his unparalleled rise to success in the computer software industry. He has managed, in spite of the complexity, to uncannily make decisions that have propelled him to the top of his profession.

This monograph examines the research question, “Do the decision making methods used by Sir William Slim and Bill Gates correspond to the theories espoused by Gary Klein with respect to patterns and anomalies, singular evaluation, and leverage points?” The author determines that both individuals use patterns and anomalies to an extent, that they do not use singular evaluation (preferring to generate and choose from among multiple options instead), and that they overwhelmingly make ingenious use of leverage points.

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CHAPTER I - INTRODUCTION

A six-foot, five-inch, 275 pound defensive end can be an intimidating opponent on a high school football field. With an appropriate level of speed, agility, and instinct, a player such as this can certainly compete at the collegiate level, if not the professional level. Football coaches teach players like this specific offensive and defensive plays from team playbooks which are designed to succeed against predicted opposing team formations. During a game, however, when the specific play selected does not exactly match the opposing team's formation as predicted, the defensive player then resorts to a rational choice strategy to decide how to adapt successfully. Coaches teach players to rationalize what they should do in these types of situations: "If the opponent does *this*, then you do *that*; but if he does *something else*, then you do *this*." A rational choice strategy is a broad, logical search for all available options, which limits the chance that any one particular option may be overlooked. It is a compelling strategy for one who lacks the depth of insight and experience, to whom a satisfactory option is not immediately (or intuitively) forthcoming. In the case of the player, since there are few options from which to choose, his analysis takes seconds to accomplish. In the art and science of football, the player is a *scientist*. His training teaches him *what to think*.

Following his successful high school, collegiate or professional career, this superb player may decide to transition into coaching himself. Although successful as a player against opposing *players*, he may find himself bewildered by the challenges of coaching and winning football games against opposing *teams*. Although he survived by rational choice strategies as a player, he quickly discovers that rational choice strategies become increasingly difficult to use as the level of complexity *increases*. For although the physical world of *both* the player and coach are confined to the same playing field space (measuring 100 by 53 yards), the player himself has a very narrow scope of responsibility. Resorting to rational choice strategies for him is a fairly simple thing. For the coach, on the other hand, the scope of responsibility runs the gamut of the *entire field of play*. On the defensive, he must guard against attacks by the opponent's offense, both on the ground and in the air. He must decide when to blitz and when to fall back into deep pass coverage. When on the offensive, he must decide when to throw and when to run the ball, *where to do so, and when*. And he must do it, successfully, under a time constraint. A coach who, overwhelmed by the

complexity of the game and unsure of where to begin to decide what to do, might likely open his team's playbook and select the very first play, with no rhyme or reason as to why, and with little hope of success. The world of the coach involves much more complexity in terms of numbers and types of decisions than that of the player, and in the *creativity* demanded of him in concocting his "game plan" of successful play combinations to use against the opposing team, a game plan which is devised to take advantage of his team's strengths and the opposing team's weaknesses. In the art and science of football, the coach is more an *artist* than a *scientist*.

If this coach were a genius, or could somehow harness the computing power of a Cray II supercomputer, he *might* be able to make all of these myriad decisions by resorting to rational choice strategies. For every single action requiring a decision, he would have to compute all of the possible options available and determine the best choice. However, for the majority of humans this is not a feasible method of coaching—or of *deciding*. The number of decisions are simply too overwhelming. Some other method, then, of deciding just what to do must be used—something short of trying to sort through every single option available in order to rationalize the best option. What other methods exist? What methods do successful coaches use? A coach is an artist. His education needs to teach him *how* to think. ***But how does one teach "art?"*** Do the best coaches just "happen?" Is success in coaching merely a Darwinian selection process? Or are there "principles" involved?

Perhaps this explains why many successful players never become outstanding coaches. They lack a sense of how to proceed. The football player/football coach dilemma is not unlike the problems of senior governmental leaders, leaders of industry, or senior military officers, all of whom face increasing and dynamic complexity as they ascend in rank and responsibility. Just as many football players have failed to become great coaches, so too have many governmental leaders, leaders of industry and military officers failed to succeed when placed at higher levels of responsibility. Understanding *how* to solve problems at increasingly higher levels of dynamic complexity is certainly important to the success of the military at large. Being able to discern a complex situation, sizing up what is happening and what is critical to the situation, knowing at a glance what is occurring and why, confidently understanding what is important (and what is *not* important), *and then making a successful decision to respond* are critical aspects of senior leader decision making. Resources at these levels are rarely sufficient to overwhelm the

opposition everywhere continuously. Divining a “path of success” that maximizes leverage over the competition at least cost is imperative for long-term operations. The principles of planning operations at the *operational* level of war, as distinct from the *tactical* level of war, begin to broach this subject by focusing on centers of gravity and decisive points. Making decisions at these higher levels involves increasingly more art relative to the science used at lower echelons. Successful scientists do not become *ipso facto* successful artists as they climb the ladder of rank and responsibility. Again, the dilemma in educating senior leaders: How does one teach art? In high school, art students are taught to imitate other artists. Yet imitators of military art have been thrashed soundly in past conflicts, derided as “methodists” by Clausewitz, since they do not truly understand the art and its particular application on the battlefield in a specific situation.

Is the art of war completely separate from the science of war? Is there a stone wall dividing the two? Or are the science and art of war at opposite ends of a continuum? Does the science of war at some point transition into the art of war, such that there *are* some basic principles that can be used to bridge the gap and facilitate the education of the art? Are there any existing decision making methods that could reinforce operational level planning principles to make them better?

In his book, *Sources of Power*, author Gary Klein discusses the difficulty of using rational choice strategies in “naturalistic” decision making settings—settings which include time pressures, high stakes, shifting conditions and complexity. Klein discusses many of his observations of individuals under these conditions and offers ideas on how to comprehend and solve complex problems, such as understanding completely the nature of the problem (situational awareness), looking for patterns as well as understanding what is *missing* from those patterns (anomalies), understanding the benefit of intuition, searching for leverage points on which to act, and using mental simulations. Other decision making theorists have proffered solutions about how to proceed as well. Do they agree in principle with Klein’s conclusions? Or do they strike out in a different direction?

One way to explore this vital issue is to examine the thoughts and decisions of those who *have* been thrust into complex, “naturalistic” decision making situations and were eminently successful, time and again. Their record of repeatedly making the right choices in a bewildering environment humbles the average man—unless the average man could study their methods in order to discern how they thought

through their problems and made their “correct” decisions. Sir William Slim faced almost insurmountable complexity in dealing with the Japanese in the China-Burma-India theater during World War II. Yet he managed to figure out a way to succeed in spite of the complexity he faced, soundly defeating the Japanese and driving them completely from the country. Bill Gates has faced complexity of an entirely different sort in his unparalleled rise to success in the computer software industry. He has managed, in spite of the complexity, to uncannily make decisions that have propelled him to the top of his profession.

Are the approaches to making decisions that these two successful leaders have used similar to the methods that Gary Klein suggests? Or are they more in keeping with the “traditional” decision making theorists? This monograph examines that issue, and answers the research question “Do the decision making methods used by Sir William Slim and Bill Gates correspond to the theories espoused by Gary Klein with respect to patterns and anomalies, singular evaluation, and use of leverage points?” The monograph answers the research question in the following manner. First, it establishes Gary Klein’s theoretical basis, and then contrasts that to the views of several other decision making theorists, to establish whether Klein’s ideas are unique unto himself. The discussion then transitions to the study of Slim’s campaigns in Burma, first by developing the events as they transpired, followed by an examination of his evident recognition of patterns and anomalies, whether he relied on singular evaluation, and whether he worked toward reliance on leverage points in framing his decisions. Following the discussion of Slim, the monograph then transitions to a similar discussion of Bill Gates. The monograph then finishes with a short section devoted to both conclusions and recommendations for the U.S. Army to consider.

The purpose of this monograph is to delve deeply, at an appropriate level in one’s career, in how to wrestle with complexity, understand it for what it is, and decide correctly on a course of action which has every hope of succeeding. It is an examination of how both Slim and Gates thought and decided, and a comparison of those thought and decision processes to Klein’s taxonomy. But this monograph is more than this simple comparison. It is also an examination into some of the little understood aspects of intuitive decision making and executive-level decision making, as well as the aspects of both critical and creative thought. It serves as a melting pot, connecting a number of appropriate thoughts and ideas gleaned while studying the operational level of war for two years. The monograph is not, however, intended to serve as a “vetting” for Gary Klein’s theories, nor is it to prove that either Slim’s or Gates’ decision making prowess

prove or disprove Klein's theoretical points. It is not intended to be a history lesson of all of the events surrounding Slim or Gates.

The discussion begins, then, with an intriguing look at a different way to deal with complexity in fast-paced situations, and how to decide *what* to do—Gary Klein and *Sources of Power*.

CHAPTER II – THINKING AND DECIDING

The purpose of this chapter is to examine the decision making ideas of Gary Klein. It begins with a short discussion of conventional decision making and rational choice strategies, followed by Gary Klein's thoughts. The discussion then contrasts Klein's thoughts with those of several other decision making theorists in order to discern which of these other decision making theorists, if any, propose ideas similar to Klein's.

GARY KLEIN AND DECISION MAKING

Conventional decision making follows a four-step process: 1) Problem definition, 2) Course of action generation, 3) Course of action analysis and evaluation, and 4) Course of action selection and execution.¹ *Rational choice strategies* are used to develop a number of different courses of action, or options, in order to “reduce the chance that an important option will be overlooked...It comes closer to error-free decision making than other sources of power.”² Rational choice strategy does have several advantages. First, decisions reached using the strategy should be reliable ones, because it is a rigorous and quantitative process. It is also a general strategy, applicable to a wide number of situations.³

The problem with rational choice strategies, however, is that it is time-consuming to determine and evaluate all of the options to any given problem. A rigorous, analytical approach can not be used easily in a dynamic, rapidly-developing situation, for example.⁴ There is an additional problem of being able to break down properly each of the tasks incident to the problem into constituent elements for analysis. Once those tasks are broken down, they tend to be treated as individual, independent problems vice components of a larger system at work. This means that the decisions rendered as a result are apt to be short of a full solution. Further, decision makers suffer from having to set up elaborate mathematical calculations which result in combinatorial explosions as they work through course of action comparison. Considering this large set of factors and trying to develop all of the implications therefrom are simply too onerous for any human or group of humans to attempt to accomplish.⁵ Finally, the traditional decision making process

coupled with rational choice strategies implies a *linear process*. In order to progress from one step to the next, all actions must be accomplished. Klein finds, however, that in light of the fact that rarely does anyone have sufficient information to do so, that anyone wanting to use rational choice strategies would literally be stuck in the information gathering mode, never to emerge from it.⁶

Klein studied several groups of people at work making decisions. Firefighters, for example, do not rely on rational choice strategies to decide how to put out fires. If they did, potentially the buildings they were attempting to save would burn down as they pondered all of the options to extinguish the flames.⁷ Klein also finds that students who have been taught rational choice strategies tend not to use them when undergoing decision making exercises.⁸ The reasons for this are that rational choice strategies are laborious and time-consuming. In fact, Klein goes so far as to state that teaching rational choice strategies to students does them a *disservice* because it pushes them through a painful, not-to-be-used-again process that stifles their creativity and initiative, the ultimate example of which is *hyperrationality*: paralysis by analysis. He feels that instead of forcing rational choice strategies upon them, those students should be put through repetitive, time-pressured decision making problems which force them to rely instead upon their intuition and other sources of power that Klein describes throughout his book.⁹

In his study, Gary Klein gravitates toward “naturalistic” decision making settings and examines how people in those environments use their expertise to solve problems. Naturalistic decision making environments are those that involve time pressures, high stakes, ill-defined problems, dynamic conditions, and inadequate information with which to work.¹⁰ Klein’s study of people successfully negotiating naturalistic decision making environments led him to develop an alternative to rational choice strategies: the Recognition Primed Decision model (RPD). RPD develops a course of action without having to resort to comparative analysis, based on the experience of the decision maker, his intuition, his understanding of what is happening and what is not happening, his ability to locate key points of leverage upon which to act, and then his ability to mentally envision how that course of action would play out, ensuring its feasibility.¹¹ Klein developed this model after having observed that decision makers in naturalistic environments tend to look for the first workable option available, rather than the best of a number of different options, because of the time constraint present. Since the decision makers in this environment could rely on their extensive expertise, they were adept at recognizing the situation for what it really was, and then mentally simulating

how their quickly-selected course of action would unfold. Even when spotting a weakness in the course of action that they had hastily developed, decision makers were able to make small corrections which strengthened that course of action. The emphasis is on being poised to act, rather than being paralyzed by analysis, waiting until all of the evaluations are complete.¹²

The Recognition Primed Decision model consists of several “sources of power”: the use of intuition, patterns and anomalies, all three of which help the decision maker in sizing up the situation to understand what is truly at work; the use of singular evaluation to develop one, feasible course of action in lieu of numerous options; leverage points, which assist the decision maker in attaining his goals at least cost; and mental simulation, which allows the decision maker to review in his mind whether his singularly-developed course of action will work. The definitions of each follow.

Intuition, Patterns and Anomalies. “Intuition depends on the use of experience to recognize key patterns that indicate the dynamics of the situation.”¹³ Klein hastens to add that intuition is *not infallible*.¹⁴ By knowing how things work, experts know what patterns they should be seeing in a situation. When things do not happen that way, they know that something is wrong.¹⁵ Pattern matching, then, is the ability of an expert to determine whether certain events are happening as they should be, based on experienced observation. Anomalies, on the other hand, are those things that an expert notices *did not* happen as expected.¹⁶ Expert decision makers use patterns and anomalies to determine when something amiss has happened, and if it has, then exactly *what*. Experts use intuition, patterns and anomalies to recognize situations for what they are; novices, on the other hand, are often at a loss for what is happening. Novices tend to be confused about all of the information they are receiving, because they focus on everything, as opposed to the most important things (which are obvious to experts).¹⁷

Klein does not draw a clear distinction between intuition, however, and patterns and anomalies. Although he devotes an entire chapter to intuition, and another chapter to patterns and anomalies, the subject matter in both chapters overlaps, implying that they are one and the same. On page 149, for instance, he refers to “...pattern matching (intuition)...,” as though they were in fact the same. Yet in other places he appears to distinguish between intuition, and patterns and anomalies. He states that “Intuition depends on the use of experience to recognize key patterns that indicate the dynamics of a situation.”¹⁸ Further, he declares that patterns and anomalies are a *part* of the intuition, stating “...an intuitive decision,

based on pattern matching...,” and “The *part* of intuition *that involves pattern matching...*”¹⁹ The point to this discussion is that, while Klein is not absolutely clear on his position, he at least implies strongly that patterns and anomalies are not the sum total of intuition, but that they *inform* intuition. What else “informs” intuition is a contentious subject, as will be seen later in this chapter. The “other parts” of intuition are traits much more intangible, with respect to patterns and anomalies.

Singular evaluation. “...skilled decision makers generate feasible options as the first ones they think of. Therefore, there is little to be gained by generating and then evaluating lots of options.”²⁰ Recognition Primed Decision making relies on singular evaluation, as opposed to comparative evaluation of several options. However, it should be noted that this singular evaluation leads to “satisficing,” which is the selection of an option which works, rather than selection of an option which works *best* (known as “optimizing”).²¹ Optimizing is hard, whereas satisficing is more efficient with respect to time. The point to be noted, however, is that in military operations, satisficing may not be as acceptable as optimizing, especially when human lives are at stake.

Leverage Points. Leverage points are those small differences that make a large difference—things that provide “more bang for the buck.” “Leverage points are just possibilities – pressure points that might lead to something useful...”²² They provide a relative advantage over other means to solve a particular problem. Leverage points potentially offer an exponential gain over an opponent, relative to the effort which that opponent must expend to counter them. They assist by taking advantage of possible weaknesses in an opponent strategy or course of action. They also assist in pointing out where one’s own course of action may be weak, and which demands some degree of protection.²³

Mental Simulation. Finally, Klein proposes that experts using RPD mentally simulate their singularly-developed course of action in order to ascertain the feasibility of it. Mental simulation is “the ability to imagine people and objects consciously and to transform those people and objects through several transitions, finally picturing them in a different way than at the start.”²⁴ It is a sort of envisioning process that uses cognitive tension to imagine “what could be” in order to fix whatever problem is currently at hand. Klein admits that there are limits to mental simulation, however. The decision maker using it must be familiar with the task (that is, be an expert); he must be able to think at an appropriate level of

abstraction; and if the level of detail for the particular task is either too high or too abstract, there is the chance that his human mind can not adequately complete the task.²⁵

In summary, Klein says that experts tend to use RPD under naturalistic decision making environments, such as dynamic conditions, time-pressures, ill-defined problems, inadequate available information, and when *satisficing* is acceptable. They use rational choice strategies when there is a need for justification of the course of action, when experience of the decision maker is inadequate, and when *optimization* is paramount.²⁶ To the decision maker, especially the military decision maker, RPD helps by acting as a sort of heuristic, providing a systemic way of discerning a problem and deciding how to act without resorting to decomposing that problem into a myriad number of smaller tasks, all of which lose their relationship to each other and the larger, systemic situation in which they actually reside. RPD also provides a framework of sorts to help the decision maker select what is truly most important from an overwhelming amount of data and information, allowing him to focus on what *will* work, discarding what is unimportant and unnecessary. It allows a way to focus on enemy weaknesses and avoid enemy strengths, while at the same time identifying one's own weaknesses, allowing for proper protection thereof.

However, the importance of expertise, and of intuition that is accurate in its assessment, is *critical* in using Klein's RPD model successfully, and therefore a potential Achilles' heel for the given commander (or subordinate staff officer) attempting to use it, should he fail to possess either in sufficient degree. As well, commanders facing opponents skilled in deception measures might be fooled using their intuition, patterns and anomalies routine, since opposing commanders will try to deceive by presenting differing patterns than that of reality.²⁷

Within the context of this monograph, the focus of Klein's RPD model is that of the following "sources of power": patterns and anomalies, singular evaluation (vice options generation), and leverage points, and the degree to which Sir William Slim and Bill Gates use any of them in thinking and deciding in their decidedly naturalistic decision making environments. However, before proceeding further, the monograph examines the thoughts of a number of other decision making theorists in an attempt to divine whether Klein's ideas are shared among them, or whether Klein stands as a lone tree apart from the forest of decision making opinion.

WHAT THE OTHER DECISION MAKING THEORISTS SAY

Research for this monograph consulted twenty-seven different authors with respect to decision making. Fourteen of these authors devoted their works specifically to decision making. Because Gary Klein also delves into intuition, and because course of action generation is synthesis - a creative process - the research includes an additional thirteen sources which concern the topics of intuition, creative intelligence, critical thinking and executive-level decision making. While an in-depth study of all of these topics with all possible resource material is obviously beyond the scope of this monograph, consulting all available resources should provide a *representative* sample of decision making theory against which to compare Klein's RPD model. The reader should also note that there is considerable overlap between the sources devoted strictly to decision making theory and the sources in the other categories, in spite of their titles.

In general, all of the other decision theorists consulted abide by the "traditional" decision making process, which is the four step process in conjunction with rational choice strategy, as alluded to earlier in this chapter. Several of the other decision making theorists specifically discuss individual sources of power, as identified by Klein. Others allude somewhat to the systemic nature of what Klein identifies as the RPD without specifically stating such. When compared to Klein and the three specific sources of power, the other decision making theorists say the following:

Patterns and Anomalies: Seven of the twenty-seven theorists discuss the importance of identifying patterns or anomalies. Harold Lewis identifies the need to look for an opponent's patterns, as well as to behave randomly in order to conceal one's own patterns—that skill is defined as learning to exploit opponent predictability while behaving unpredictably.²⁸ Karl Albrecht highlights the need to see "commonplace objects...in terms of *recognition cues*, not in terms of their detailed structures," which places importance for executive decision makers to see the forest, not the trees.²⁹ Albrecht goes on to say that mental patterns allow one to relate to a previously perceived situation when it reappears, reinforcing the notion of expertise is using patterns and anomalies.³⁰ Michelene Glaser (with Robert Chi and Robert Glaser) almost repeat verbatim some of Klein's assertions, noting that experts rely on understanding and reproducing large patterns in lieu of generating numerous courses of action, and that "experts perceive

large, meaningful patterns in their domains...the ability to see meaningful patterns does not reflect a generally superior perceptual ability; rather, it reflects an organization of the knowledge base.”³¹ Finally, Craig Loehle points out that *strategic* decision makers tend to solve their problems by hinging on the paradoxes and contradictions resident in their situations—alluding to their use of patterns and anomalies to notice what is wrong, and why.³² The reader should remember, however, that in spite of the insight discussed here, it reflects the fact that only seven of the twenty-seven theorists consulted included any portion of their work to patterns or anomalies.

Leverage Points. Only three of the twenty-seven theorists addressed leverage points. Albrecht, in discussing how *adaptive* thinkers operate, states that an adaptive thinker:

Looks for the *dominant factors in a given situation* and asks...whether they could or should be changed. He spots the *hidden assumptions and controlling values* in a situation, and thinks about the effects they might be having...Out of the virtually uncountable number of features you could pay attention to, *you will usually find a few of primary importance to you*. You can identify these key factors by first deciding what your personal interests are...*often you may find that one or two key factors really dominate the overall situation and have the effect of structuring the entire process.*³³

John Hammond (with Ralph Keeney and Howard Raiffa) points out that “usually, only one or two elements [in a specific situation] will emerge as the most critical.”³⁴ Finally, J. Edward Russo and Paul Shoemaker use a sports analogy to highlight the importance of using leverage points, by stating “Good coaches... focus on a few key points—often simple points. Once you master these points, your play improves enormously.”³⁵ As seen above in the section on patterns and anomalies, however, the reader should note that only three of the twenty-seven theorists broached this aspect of Klein’s sources of power.

Singular evaluation (vice options generation). **Not one of the twenty-seven theorists discusses anything resembling Klein’s notion of singular evaluation.** Instead, they all discuss the merits of rational choice strategy, of plunging into a wide array of options in order to eliminate the possibility of overlooking the best solution. Eighteen of the twenty-seven specifically cite options generation and rational choice strategy as their modus operandi. In general, the group at large implies a concern for jumping to conclusions which is avoided in rational choice strategy philosophy—that broad search is proper in solving complex problems. John Hammond points out that the best solution can be no better than the best of several alternatives—implying that the absence of those alternatives potentially leaves one short.³⁶ Stephen Brookfield admonishes that, “When we become critical thinkers...We become skeptical of

quick-fix solutions, of single answers to problems."³⁷ Neal Charness feels that, "Even experts cannot usually rely solely on [pattern] recognition. Experts have to *search for solutions* to problems..."^{38,39}

Taken as a whole, then, it follows that the "other decision making theorists" are at odds in their theoretical beliefs with Gary Klein and his RPD model. Although a few indicate that the use of patterns and anomalies are important in the decision making process, even fewer make mention of the use of leverage points to develop those courses of action. As a group, they fail to mention singular evaluation at all, and they stand behind the rational choice strategy method of decision making, to Gary Klein's theoretical dismay.

The question for this monograph then becomes whether or not Sir William Slim and Bill Gates think and decide along the lines of Klein and his RPD model, or whether they also tend toward the rational choice strategy model resident in the larger field of decision making theorists. Before proceeding to that analysis, however, the monograph discussion turns to several interesting points found in the research of the twenty-seven decision making theorists, which are relevant to leaders ascending the ladder of rank and responsibility. These discussion points concern strategic thinking, situational awareness, and intuition.

STRATEGIC THINKING

The amount of time that executives must devote to decision making typically increases as they move up the management ladder...Decision making...is a science that embodies generous quantities of art.

Alfred Richard Oxenfeldt, David Wendell Miller, and Roger A. Dickman,
A Basic Approach to Executive Decision Making

Strategic thinking is a topic several of the other decision making theorists discuss. It is a topic that is appropriate for students who desire to understand the differences of decision making at the highest levels of any profession. Craig Loehle, author of *Thinking Strategically*, discusses this topic more than any of the other theorists. In his opinion, strategic thinking consists (in part) of strategic intelligence—the ability to foresee, to plan ahead, and to find the best route or scenario to obtain a desired outcome.⁴⁰ Loehle classifies the three pillars of professional productivity as consisting of skill, motivation, and strategic use of time and effort—understanding what is important, and what is not. Strategic use of time and effort, to

Loehle, is the ultimate key to success for a strategic thinker. Choosing the *right* problem to solve, solving it cost-effectively, efficiently, innovatively, and productively, as opposed to simply wading into the complexity and detail, is crucial to success.⁴¹ Loehle argues that it is not *just* effort and hard work that is important. Rather, it is identifying what the real problem is, and strategic thinking (before acting) is necessary to identify just that problem. “Strategic thinking is not just a brute force approach, but rather requires wise and efficient use of mental faculties to be more effective. *The logic is that it is more important to be effective than to be busy*, because in the realm of complex problems the most important thing is to not start off down the wrong path.”⁴² Although not eschewing hard work, Loehle is arguing that it is too easy for anyone faced with complexity to simply jump in with both feet and begin to work vigorously, comforted that in the mental anguish of the complexity with which one is faced, accomplishing *something* is better than *nothing*--albeit without understanding what truly must be done. The implication of this statement for military officers who pride themselves on making progress, decisively “getting results,” and continuously accomplishing their objectives, is significant.

Loehle points out that the difference between a strategic thinker worthy of the name, and an untutored individual, is that the strategic thinker has mental structures at hand for organizing information and making the necessary connections between the elements of information received, whereas the untutored individual at best possesses a disordered thought process.⁴³ Loehle explains that higher education does not prepare people for dealing with complexity, because it focuses on procedural knowledge and solutions of well-defined problems. Complexity, on the other hand, calls for novel responses.⁴⁴

J. Edward Russo and Paul Shoemaker agree. They feel that most decision makers at the strategic level in fact spend the bulk of their time gathering facts and making their decisions, without understanding the context within which they operate. They leave the least amount of time for framing the decision problem at hand.⁴⁵

Loehle also feels that “Military campaigns provide invaluable examples of strategic reasoning [thinking].”⁴⁶ In fact, three of the other decision making theorists allude to senior military leaders and military campaigns as excellent examples of strategic thinking. Although the group of military officers at large could probably benefit from education in strategic thinking, the inference is that perhaps at the highest

levels, those officers that are charged with thinking about the most complex problems innately possess those skills already.

SITUATIONAL AWARENESS

Situational awareness is related to strategic thinking. It benefits from the use of patterns and anomalies as a means of discerning what the problem is, and how it is related to the surrounding environment as a *system*. Although few of the other decision making theorists allude to patterns and anomalies, several of the theorists do discuss the importance of proper situational awareness as a vital element of the decision making process. Several of the theorists also discuss situational awareness of the problem to be solved in terms of a *system*.

Proper problem definition facilitates decision making, especially in complex situations. "In many situations, defining the problem will be the most difficult phase: once you have correctly defined the problem, the rest will be relatively easy."⁴⁷ Glaser and Chi discuss the fact that experts are able to see to a deeper level of awareness than novices are, and that even though experts are faster than novices, experts actually take longer at developing the situation in the early phases of decision making, because they are gathering in a wide basis for proper situational awareness. Experts spend a great deal of time analyzing *qualitatively*. Novices plunge in—they have a limited basis to comprehend what they are seeing, and come away with an immature picture of what the problem actually is.⁴⁸ Loehle agrees, in part. He finds that good students take longer to read and understand a problem, but are quicker to solve the problem once they have figured out what the problem really is.⁴⁹ Loehle also feels that many times the nature of the problem, if discerned from a proper perspective, simultaneously provides a solution to the problem.⁵⁰ In other words, taking time to completely understand the problem in all its complexity, and understanding the system at work underneath the surface of the problem, potentially rewards the patient problem solver by beginning to reveal to him possible solutions to that problem. Finally, proper problem definition also relies on what Stephen R. Covey and Karl Albrecht term as "open-mindedness," the ability to view a problem absent any preconceived notions *a priori* as to what the true situation is.⁵¹

The second aspect of situational awareness discussed by the other decision making theorists concerns itself with seeing the problem as a *system*, or an interconnected set of variables which influence each other. In discussing his findings of senior executives in decision making environments, Alfred R. Oxenfeldt feels that executives often have abundant facts with which to decide, but that they do not understand the forces that determine the fluctuations in cost, output, etc. As such, they require both the facts and some type of business model that would help them relate to what is happening, and why.⁵² This is an indirect reference to understanding the systems which are related to the executives' decision making environment. Dietrich Doerner and Julia Schoelkopf agree somewhat:

Success is not simply a matter of paying attention to a few central features of a situation; it is, rather, a matter of paying attention to the configuration of the features, which in each case will be extremely specific and individual...Methodists do not adapt to the requirements of each individual configuration. They have two or three methods, and these are applied in accordance with a few central indicators; the uniqueness of the situation found in the specific configuration of features is not taken into consideration.⁵³

Several of the other decision making theorists acknowledge systems in less detail.⁵⁴

INTUITION

At any given moment one is conscious of only a small portion of what one knows. Intuition allows one to draw on that vast storehouse of unconscious knowledge that includes not only everything that one has experienced or learned, either consciously or subliminally, but also the infinite reservoir of the collective or universal unconscious, in which individual separateness and ego boundaries are transcended.

Frances E. Vaughan, *Awakening Intuition*

Of all of the ideas espoused by the other decision making theorists, none is more contentious than that of intuition—"the act or faculty of knowing without the use of rational processes; immediate cognition."⁵⁵ Weston Agor, author of *The Logic of Intuitive Decision Making*, states "Intuition appears to be a skill that is more prevalent as one moves up the management ladder...the higher one goes in the level of government...the greater the ability to use intuition."⁵⁶ Agor also feels that top executives in the companies that he studied differ significantly from their subordinates in one key aspect: their ability to use intuition to make decisions.⁵⁷ The discussion that follows will present the thoughts of theorists who support intuition, followed by those who argue against it.

Thoughts in support of intuition. Philip Goldberg, author of *The Intuitive Edge*, provides a wealth of insight into intuition and its applicability to decision makers. To someone in a complex decision making environment, an “intuitive experience” is one in which the decision maker senses a data burst of insight instantaneously: “It will usually contain a richness of meaning that will take an eon to articulate compared to the time it took to apprehend.”⁵⁸ To Goldberg, everyone is intuitive to a degree, but some seem so more than others, who “are right every time; they make the smartest decisions and solve the most intractable problems without much ado.”⁵⁹ A creatively intuitive person would generate an unusually high number of solutions to a problem, each of which would solve it.⁶⁰ Intuition allows people to make discoveries and connections without having to resort to a huge number of logical calculations.⁶¹ Goldberg hastens to add that intuition is not magic. Instead, intuition works with information that is stored subconsciously in the brain.⁶²

Rational thought (rational choice strategies), on the other hand, tends to be linear and sequential in its approach, and Goldberg feels that teaching institutions emphasize rational-empirical thought too much, “...driving the intuitive aspect to the ground.”⁶³ Relying solely on rational-empirical thought is like “tuning in with mono to a stereo world.”⁶⁴ Rational-empirical thought works best when people control or can predict all of the variables at hand, when they can measure or quantify precisely, and when complete and adequate information exists. Needless to say, that level of precision rarely exists. Further, he feels that exclusive, rational-empirical thought processes do not account adequately for subjective elements, and that these processes encourage a narrow, bottom-line mentality—that people using them tend to break things into parts that *should* be viewed holistically.⁶⁵ Intuitive thought is nonlinear, nonsequential, and its genesis is inexplicable. The intuiter might be able to retrace why he intuitively came up with an idea, but the entire exercise would be one of retroactive reasoning.⁶⁶ Intuitive personalities are stimulated by abstract ideas and by implications and relationships among concepts. They like doing things their own way, because the complex, the unknown and the novel attract them.^{67 68} Goldberg explains that people are dependent upon intuition to tell them if they are on the right track in complex situations, or when forced to deal with incomplete information, unfamiliar subject matter or ambiguous premises, all of which hearken back to Gary Klein’s naturalistic decision making environment parameters.⁶⁹ Finally, Goldberg establishes a tie between novel and expert decision makers, noting “Novices have to pay attention to each little

detail...Veterans don't have to attend to minutiae, so their minds are free to dart about making intuitive leaps.⁷⁰

Several of the other decision making theorists agree in principle. Hyman Ruchlis, Sandra Oddo and Albert Sarney feel that intuition—sudden insight—comes to an individual who thinks about a problem for an extended period of time, although that intuitive insight is not always true. When it does happen to people armed with excellent information, however, the insightful intuition does often lead to success.⁷¹ Paul Moody explains that people who lack the mathematical means to solve problems may well have to resort to intuition to make their decisions.⁷² Weston Agor notes that fellow theorist Carl Jung had determined that managers who became skilled in intuition tended to possess better decision making skills, in that they could see new possibilities in any given situation, that they had a sense or vision of what was coming and how to react to it, that they were adept at generating new ideas and ingenious solutions to problems, and that they dealt effectively with rapid change, crisis, and highly complex decision making situations.⁷³ Agor also states that the situations in which intuition is most helpful are the those that are characterized by high levels of uncertainty, little previous precedent, variables which are not scientifically predictable, limited “facts” which do not clearly point which way to proceed, limited time and intense pressure to be correct.⁷⁴ Without intending to do so, Agor almost captures Gary Klein’s naturalistic decision making environment parameters completely.⁷⁵

Thoughts against intuition. Several theorists, however, view intuition as a double-edged sword which should not be relied upon. It is ironic that some theorists, who support intuition, would point to the well-researched case of chess grandmasters, who seemingly make rapid-fire decisions on chess moves in environments characteristic of naturalistic decision making, based on their intuition. Adriaan de Groot, who conducted the study, found instead that chess grandmasters

Perceived and recognized the characteristics of a chess position and evaluated their possible moves by relying on their extensive experience rather than by uncovering those characteristics by calculation and evaluation of more possibilities. The superior chess playing ability of more experienced players, according to de Groot, is attributable to their extensive experience, allowing retrieval of direct associations in memory between characteristics of chess positions and appropriate methods and moves.⁷⁶

De Groot found that chess grandmasters could be shown a *meaningful* chess position (a position which would likely occur in an actual game) for between two and ten seconds, and then recall that position *exactly* by relating to the position as a holistic pattern, while inexperienced players could not. On the other hand,

the same chess grandmasters *could not* recall a completely random, scattered chess position any better than an inexperienced player. The grandmasters could recognize the meaningful chess positions because of the enormous experience that they had built up during their careers, which would equate (in the physical terms of a child attending school) to ten years of eight-hour school days to learn and memorize all of the different combination patterns possible (not to mention being able to recall all of them within ten seconds).⁷⁷ The implication of these findings is that the grandmasters did not rely on intuition *as much as they relied on their powers of pattern recognition*. Therefore, any claims by the “intuition-supporters” that the chess grandmasters were using intuition are misguided. What the chess grandmasters were doing, instead, was relying on their abilities to spot patterns, rather than the larger context of their intuitive powers as a whole. Further, as important as intuition and pattern recognition are to the experienced player, if it takes ten years for a grandmaster to be able to master all of those patterns (and develop the intuition required), it does not bode well for less experienced participants (and aspiring decision makers).

Russo and Shoemaker feel that good procedures in decision making are better than relying on intuition, although all decision makers rely on it to some degree. “Intuitive, seat-of-the-pants decisions seldom take account of all of the information available.”⁷⁸ Even the U.S. Army’s Field Manual 22-100, *Army Leadership*, pointedly cautions “In many decisions, you must think critically because your intuition—what feels right—may lead to the wrong answer.”⁷⁹

The strongest advocate against intuition is Massimo Piattelli-Palmarini, author of *Inevitable Illusions: How Mistakes of Reason Rule Our Minds*. Piattelli-Palmarini argues that the ideal, rational judgements of people in decision making processes are influenced subconsciously (and unintentionally) by spontaneous judgements—hence, “inevitable illusions.”⁸⁰ Using intuition, to him, is a heuristic: “...a simple and approximate rule...that serves to solve a certain class of problem.”⁸¹ He explains that people fall into the trap of using heuristics in solving problems. These shortcuts are a good thing if they are proper, but that bad shortcuts lead people to completely different and erroneous conclusions, and that people do not realize that they have done so. Instead, the people who have succumbed to “inevitable illusions” are fooled because they feel that they have completely rationalized their decision making.⁸² Imagine, he ponders, that if people fall into these inevitable illusion traps during specific, logical decision making, what most likely happens when people are faced with making decisions under time constraints and

without complete information?⁸³ The similarity to Gary Klein's naturalistic decision making parameters is uncanny. Piatelli-Palmarini feels that intuition, which subconsciously and unknowingly leads people astray from the truth, must be discarded if they are to see any problem rationally.⁸⁴

Finally, to be balanced, two of the decision making theorists who argued for intuition above also propose a level of caution when doing so. Weston Agor mentions that top executives are quick to point out that intuition is only one resource, and do not advocate relying solely on intuition, or abandoning more traditional decision making methods.⁸⁵ Goldberg, the theorist who provides the most insight about (and support for) intuition, wisely admonishes that intuition and rationality need to be finely balanced.⁸⁶

ANALYSIS AND SUMMARY

What should one make about the ideas addressed in this chapter? First, that Gary Klein's theoretical ideas as a whole are largely shared by no one else. He stands alone in his insistence that decision makers in naturalistic environments eschew rational choice strategies for the Recognition Primed Decision making model, and rely on intuition, patterns and anomalies, singular evaluation and leverage points to decide a course of action. While several of the other decision making theorists allude to some of Klein's ideas singularly, none seem to appreciate Klein's holistic understanding of a systems approach to solving problems. The other decision making theorists do make solid comments about the importance of situational awareness, both in terms of properly defining the problem beforehand, and of sensing the problem environment systemically. But their discussions of the problem environment's "system" at work tends to be made with shallow discussion, almost in passing. That is perhaps why Gary Klein's ideas resonate so well with students of the military art—his Recognition Primed Decision model contains many of the elements which correspond to planning for military operations at the operational level of war.

The contentious discussion surrounding intuition makes one wonder whether or not intuition can be trusted as a decision making tool at all. The discussion rages on both sides of the issue, leaving doubts as to its utility. One must remember that Klein mixes his discussion of *intuition* with *experts*. If someone is not an expert, reliance on intuition is an invitation to disaster. The real debate surrounds whether experts themselves can use intuition. Experts, so the discussion goes, have been through all of the options before—

they have internalized them. In spite of his thoughts, several of the other decision making theorists do not seem to give credit to experts being able to use intuition successfully.

Yet the issue of the chess grandmasters seems to highlight two subordinate thoughts on intuition. First, for an expert to develop all of the experience required to be able to rely on patterns and anomalies incident to his profession, serious education and preparation for each position of responsibility must be invested in that individual. Second, if intuition can even be remotely trusted, then repetitive training exercises exposing the prospective senior decision maker to its double-edged sword must be a part of that education. If intuition can be seriously developed and relied upon, it then gives one pause to consider whether the Briggs-Meyers label of “ISTJ” (introverted-sensing-thinking-judging), found in most senior decision makers, should not instead be “INFJ” (introverted-intuitive-feeling-judging), an admission that intuition is indeed most important at senior levels, and that too much stock is currently placed in just getting things *done*.

One other thought, posited by Moshe Rubenstein, is that in spite of the venom against heuristics, they have a place. “Heuristic reasoning is also known as plausible or inductive reasoning.”⁸⁷ Not discussed by any of the decision making theorists is the fact that decision making is both a scientific *and* an artistic process, consisting of deductive *and* inductive reasoning. This is perhaps why many of the other decision making theorists’ discussions appear so droll—they reflect only the scientific, or deductive aspect of the decision making process, alluding to inductive reasoning and creative thinking only in passing. If one is to truly appreciate the decision making process for what it is—scientific and artistic—then one must accept the fact that one must operate within the minefield of heuristics.

Significantly, however, is the fact that none of the other decision making theorists agree with Gary Klein’s assertion that singular evaluation should be the method of deciding which course of action to execute. Klein alone maintains this assertion. All others maintain that developing numerous options, analyzing them, and then comparing them in order to determine the best option, is the best decision making method. It remains to be seen whether Sir William Slim or Bill Gates rely on singular evaluation, in addition to the other two sources of power of Gary Klein’s Recognition Primed Decision model. In order to ascertain that, the discussion now turns to the first of the two: Field Marshal Viscount Sir William Slim.

CHAPTER III -THE MARSHAL MAGICIAN

When a man can not distinguish a great from a small event, he is no use. Now Slim is quite different. I can work with him.

Sir Winston Churchill

Sir William Slim served a distinguished career in the government of Great Britain. Born August 6th, 1891, he served in the Great War, fighting in Gallipoli, France and Mesopotamia. He fought early in the Second World War as the Commander of the 10th Infantry Brigade and the 10th Infantry Division, which campaigned in the Sudan, Syria, Iraq and Persian regions. Following his successful efforts in Burma, he went on to serve as the Commander-in-Chief, Allied Land Forces, Southeast Asia, from 1945-1946. After a brief, one-year stint as Commandant of the Imperial Defence College, he then served as the Chief of the Imperial General Staff from 1948-1952. His finished his career as the Governor-General and Commander-in-Chief, Australia, from 1953-1960, after which he retired.⁸⁸

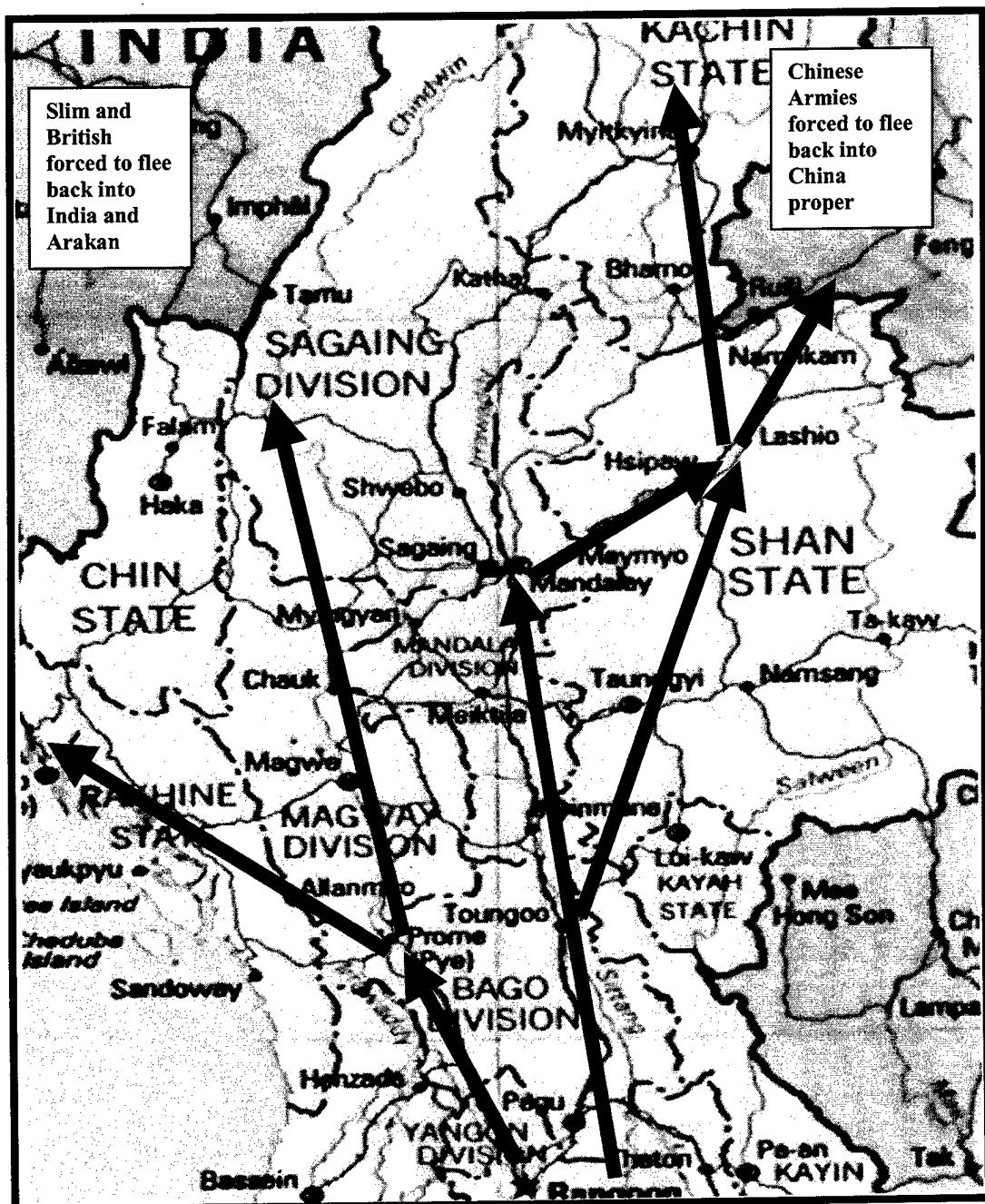
Slim's greatest accomplishment, however, was his three-year struggle against the Japanese in Burma. Literally thrust into an unforgiving landscape, against a seemingly insurmountable foe, suffering defeat and humiliation during his first six months on the job, Slim learned quickly how to fight against his foe and resiliently rebounded to drive the Japanese completely from the field over the next two years. This is the story of his escapade against the soldiers of Nippon. This chapter first describes Slim's war with the Japanese, which breaks out into three distinct phases. First, his early experience, during which the Japanese pushed him and his Army out of Burma (March to May, 1942). Next, the monograph discusses his successful reentry into the Burma theater, and the operational defeat of Japanese forces at Imphal and Kohima (February to May, 1944). Following this victory, his third phase was the rout of all Japanese forces in Burma, ending with their complete defeat (June of 1944 to April of 1945).⁸⁹ The chapter then discusses Slim's use of patterns and anomalies, whether he favored singular evaluation (or options generation), and his use of leverage points. The chapter concludes with a short analysis and summary section before proceeding to the chapter on Bill Gates.

SLIM IN BURMA – WHAT HAPPENED

Phase I – The debacle in Burma (March to May, 1942). In March of 1942, Slim (operating in the Middle East) was urgently sent for by the Supreme Commander of British and Indian forces in India, Field Marshal Sir Harold Alexander.⁹⁰ Having barely escaped capture in Rangoon (Burma) by the Japanese himself, Field Marshal Alexander had received permission to insert Slim into Burma with the intentions of stemming the Japanese invasion tide before it reached epidemic proportion. Slim, therefore, was thrust into Burma against a Japanese threat that nobody had foreseen, with insufficient forces at his disposal, arrayed haphazardly across the waist of Burma.⁹¹ Once the Japanese had decided to invade Burma, nobody could have improved the then-indefensible British positions. Burma represented a house of cards, thanks in part to a lack of British focus in intelligence efforts. The British Government had placed Burma extremely low in priority dating back to the 1920's, in part due to the perceived invincibility of Singapore.⁹²

Slim's mandate was to "win time" by delaying the Japanese invasion, holding on to key portions of the country, especially the key city of Rangoon, and keeping the Japanese as far to the east (and away from India) as possible.⁹³ The overall British objective was to prevent the Japanese from severing the overland link from India to China. Slim had two main British - Indian divisions with which to work (one of which had been trained in *desert* warfare), although Generalissimo Chiang Kai-shek of China sent two additional armies to assist him, allowing Slim to concentrate his two divisions in the western portion of Burma, astride the Sittang River.⁹⁴ Slim's problems were insurmountable, however. He suffered from a lack of intelligence. His troops were poorly trained in jungle warfare and reliant upon mechanical transportation (which necessitated clinging to roads), combat units were low in terms of men and equipment, and morale was flagging.⁹⁵ The British were powerless to stem the Japanese invasion. The British and Chinese forces retreated northward for over one thousand miles, mostly on foot, out of Burma completely during the next two months.⁹⁶ Mercifully, the arrival of the six-month monsoon period in May of 1942 halted the Japanese from proceeding further.

Slim learned valuable lessons during this debacle. First, he took measures to create intelligence units that would allow him to know what the enemy was doing; during the retreat, Japanese forces would emerge from the jungle, seemingly out of nowhere. He mandated training for his soldiers which would

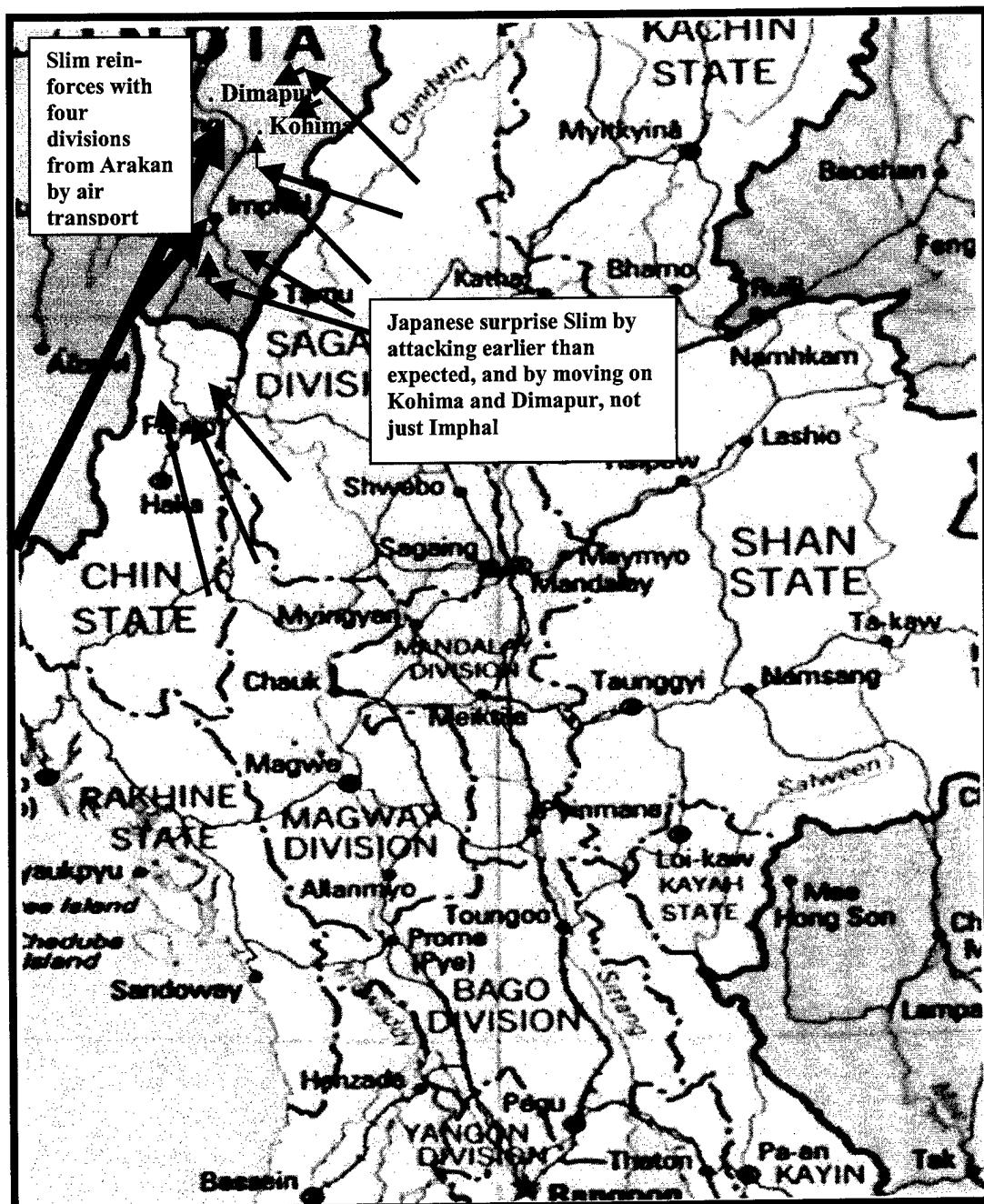


Burma – Japanese Invasion Routes, 1942)

(Maps shown on pages 24, 26 and 29 are adaptations of versions shown in Slim's *Defeat Into Victory*.)

allow them to use the jungle to their advantage, rather than allow it to be foreign and hostile. Learning to use the jungle translated to extensive training in patrolling operations (which also reinforced the intelligence that he needed) and learning to accept that in the wide, Burmese expanse of jungle terrain, the possibility of being flanked or surrounded by the enemy was high. Therefore, he taught his units to become accustomed to being surrounded or cut off, and not to panic. His response to this likely event was to promise his troops that friendly reinforcements would quickly be enroute to smash the enemy. Stay put, he admonished, because staying put allowed his units to occupy and defend key pivot points in the countryside, around which his other forces could maneuver against the besieging Japanese forces in a war of attrition. Slim added to this tactic his ability to resupply his units by air, eliminating the need to hang onto scarce roads which the Japanese inevitably blocked. Slim also learned to use the Japanese aggressiveness and momentum against themselves—by combining that notion with two key intelligence facts he had learned. First, Japanese commanders condescended their foes, arrogantly attacking along tenuous lines of communication and rarely with more than nine day's supplies. They did this because they considered victory assured.⁹⁷ Second, Japanese commanders were formidable when allowed to pursue their objectives without being upset in their plans, but were thrown into confusion by the unexpected.⁹⁸ Finally, Slim took detailed measures to correct the hideous effects of disease on his troops, which sapped the fighting strength of the combat units.⁹⁹

Phase II—The battles surrounding Imphal and Kohima (February to May, 1944). As a result of improved British intelligence, Slim began operations in late 1943 - early 1944 with an eye toward luring the Japanese into an operational trap at the key plain of Imphal, just north of the Burma-India border.¹⁰⁰ Slim's intention was to severely weaken the Japanese *before* moving into Burma, by destroying three to four Japanese divisions.¹⁰¹ The war for the Japanese was not going well at this point, and the British felt that the Japanese had intentions of continuing northward through Imphal and into India, hoping to incite the Indian population in an uprising against the British.¹⁰² Imphal, a plain forty miles long by twenty miles wide, in the middle of countryside otherwise populated with treacherous mountains, jungle, and barely passable cart tracks, contained the British forward supply depots for their intentioned reentry into Burma.¹⁰³ (The Burma front at this point of the war stretched for over seven hundred miles, from the Chinese border to the western Burma province of Arakan, with mountain ranges as high as ten thousand feet. So



Burma – Imphal/Kohima, 1944

forbidding was the terrain that no peacetime trade routes between India and Burma existed except for cart tracks and footpaths, unusable during the monsoon period. This placed extreme importance on the roads leading into and out of Imphal, Kohima, and Dimapur, the rail town to the north of Imphal astride rail communications to India.)¹⁰⁴ The Japanese looked eagerly at destroying those British bases, eliminating the chance that Slim could reenter Burma.¹⁰⁵

Slim's strategy at Imphal was a direct reflection of his lessons learned over a year earlier during the retreat: withdraw forward units into stable pivots of maneuver, display no concern about Japanese infiltration and encirclement of forces so positioned, cut off the encircling Japanese from their lines of communication, and then destroy those encircled forces with mobile reserves.¹⁰⁶ He intended to meet the Japanese on ground of his choosing, concentrate superior British forces (in part via air movement), and destroy them.¹⁰⁷ If successful, the Japanese would be left at the end of a long, uncertain and vulnerable line of communication at the onset of the monsoon season, coping with muddy quagmires, washed-out roads, broken bridges, and disease: all without a means to resupply by air.¹⁰⁸

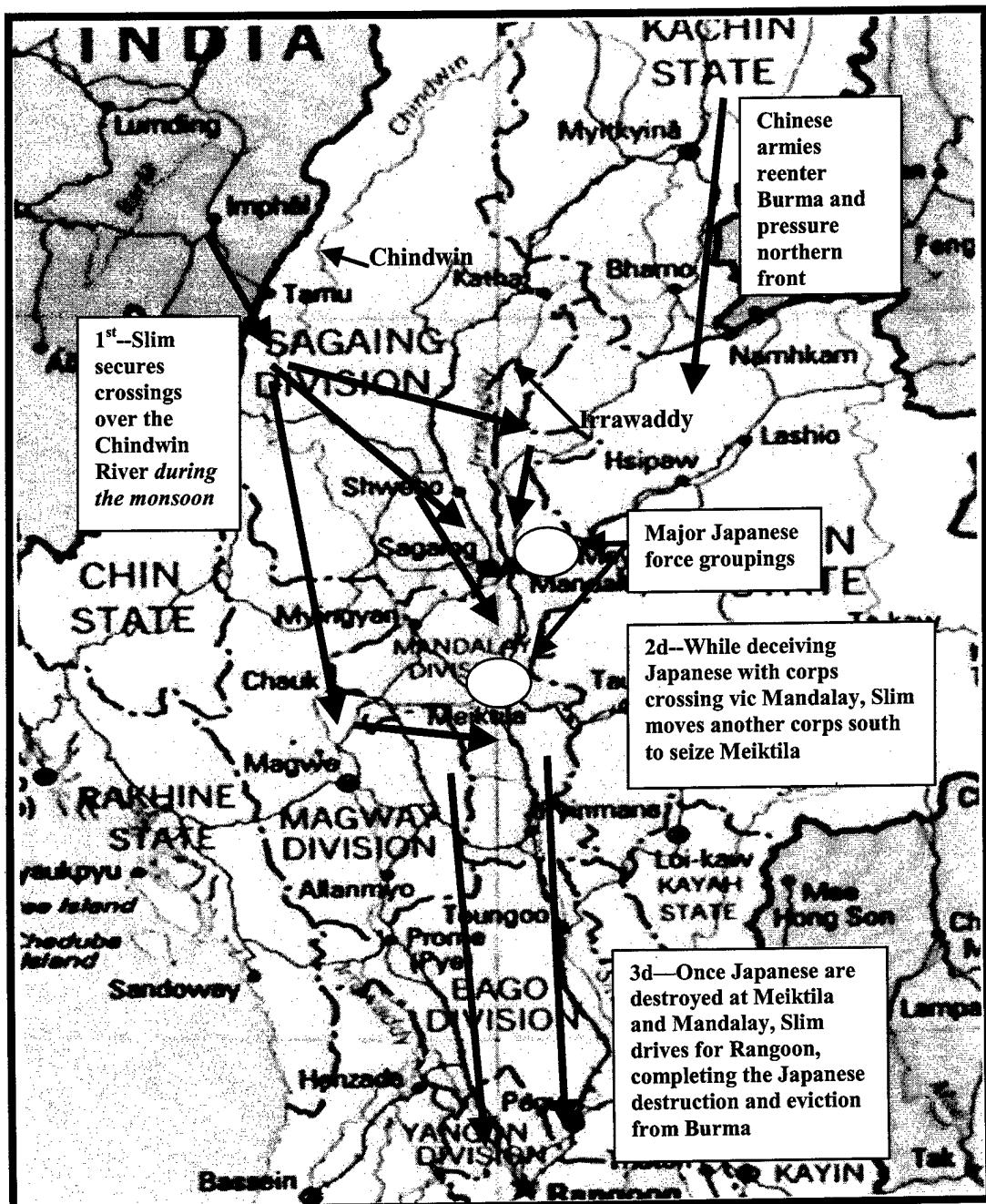
The Japanese did attack Imphal, although they surprised the British somewhat, attacking earlier and making an attempt on Kohima and Dimapur as well, a much wider operation than what the British had expected. Yet the British managed to overcome their initial surprise, settling down into a bloody struggle of attrition, lasting until the onset of the monsoon. The Japanese commander, General Mutaguchi, had sent his forces to Imphal with only twenty days' supplies, and operating at extended distances over harsh lines of communication, certain of reaping the benefits of the British supplies at Imphal following their victory.¹⁰⁹ The results were not favorable for the Japanese. Slim magically moved his key operational forces, not by ground, *but by air*—highlighting a significant strength that he possessed relative to the Japanese. General Mutaguchi had hoped to be in possession of Imphal and Dimapur by the onset of the monsoon season (in May); instead, he found himself with an attrited army, sick soldiers, militarily beaten and now forced to endure the onset of monsoon in one of the most unfavorable operational areas of the world.¹¹⁰ Of his one hundred thousand troops which began the operation, Mutaguchi lost fifty-three thousand. He lost five division equivalents (two others were badly mauled) and a significant number of tanks and field guns.¹¹¹ In comparison, the British lost sixteen thousand, many of whom were medically returned to fight in the subsequent battle for Burma, thanks to Slim's efforts at improving the health of his

soldiers.¹¹² "Although the final defeat did not come to the Japanese until a year later, this was the crucial battle of the Burma campaign."¹¹³

Phase III– the rout and defeat of Japanese forces in Burma (June of 1944 to April of 1945).

Immediately following the victory at Imphal and Kohima, Slim sent two of his divisions to pursue the fleeing Japanese *in spite of the monsoon season*. Their mission was to secure river crossings over the Chindwin river, allowing for a successful drive the following November, which they succeeded in doing.¹¹⁴ Slim's intentions were to bring the Japanese to battle again and completely destroy them, thereby giving him the ability to secure Burma. He selected the river plain at Shwebo, which sits between the Chindwin and Irrawaddy Rivers, hoping to lure the Japanese there.¹¹⁵ The Japanese had other intentions, however, and elected to defend to the east of the Irrawaddy. Slim instead selected a different course of action, electing to deceive the Japanese as to his original intentions, thereby fixing them in their Irrawaddy defensive positions, and instead attacking with a corps much further south, seizing the city of Meiktila, which was a key operational base for the Japanese.¹¹⁶ To succeed, this corps (the 4th) would have to march three hundred miles unobserved through two valleys, establish a bridgehead over the Irrawaddy, and then hurl itself upon Meiktila before the Japanese could determine what was happening and react.¹¹⁷ By March 4th, 1945, Slim's 7th Division had crossed the Irrawaddy and moved eighty miles to seize Meiktila. Forced into battle to defend their vital lines of communication and prevent complete collapse, the Japanese were steadily attrited and destroyed.¹¹⁸

Between August 6th, 1944 and May 5th, 1945, Slim moved his Army, including tanks and vehicles, over one thousand miles through undeveloped country, crossing two wide, defended rivers, and inflicted a mortal defeat on the Japanese. He accomplished all of this while at the bottom of the British flagpole of theater priority.¹¹⁹ The discussion now turns to whether Slim's actions reflect any of the following Gary Klein sources of power: patterns and anomalies, singular evaluation, and leverage points.



Burma – Meiktila/Rangoon 1944-1945

PATTERNS AND ANOMALIES, SINGULAR EVALUATION, AND LEVERAGE POINTS

Patterns and Anomalies. Patterns and anomalies, at least initially, were problematic for Slim, because he lacked an intelligence network to inform him as to what was happening.¹²⁰ Discerning the Japanese intentions was not difficult, but obtaining detailed information was. Slim was practically blind. There was “...no air reconnaissance, no well-established intelligence network, [and] a lukewarm native population infiltrated by active dissidents.” Only one officer in the entire Burma Corps was fluent in Japanese.¹²¹ To remedy this problem, Slim recruited volunteers to stay behind the lines and report during the 1942 retreat, and deeper inside Burma installed Force 136, a branch of the British Special Operations Executive.¹²²

Those measures began to pay off later in 1943, when Slim was contemplating the Imphal-Kohima operation, although even then he lamented that intelligence on the Japanese was still lacking.¹²³ By late January, 1944, Slim’s intelligence allowed him to form a pattern of “increasing indications” that a Japanese offensive was imminent. Enemy activity and strength had increased, maps and operations orders taken from killed Japanese were indicative of the coming attack, British pilots began to see great collections of logs on rivers (for bridging and rafting), as well as cattle being herded forward toward Imphal (as food supplies). Patrols brought in reports of Japanese massing mechanical and animal transport. “All these clues, painstakingly fitted into the mosaic of our intelligence at Corps and Army HQ, began to give us a general picture of the enemy intentions.”¹²⁴ Additional evidence of the impending attack on Imphal included the departure and northward movement of the Japanese units in the Chin hills, identification of the Japanese 33rd Division (previously allocated far to the west in the Arakan campaign), and repair of the Sittang bridge, blown up previously by the British during the 1942 retreat.¹²⁵

Slim noticed an anomaly once the Japanese began their attack. He had not foreseen that the Japanese would move in strength on both Kohima and Dimapur, because of the difficulty in reaching those two locations. Yet that is exactly what the Japanese did. Although unable to pinpoint these efforts early,

Slim was able to discern that the Japanese were making moves toward both areas, and reinforced them both (in part by air movement) in sufficient time to head off disaster.¹²⁶

Following victory at Imphal, Slim's intelligence network confirmed the extent to which the Japanese forces had been destroyed: losses of tanks, guns, equipment and vehicles, and disorganization of higher Japanese command, as well as the significant numbers of Japanese dead found neatly executed in field hospitals.¹²⁷ Slim used this pattern to reason successfully that pursuit of the remaining Japanese and establishment of Chindwin bridgeheads *during* the monsoon season would be key to subsequent victory during the following maneuver season. Slim also noticed a peculiar anomaly at this point. The Japanese had slipped away following Imphal and Kohima, abandoning their positions, which was uncharacteristic of an enemy that normally fought to the death. It confirmed to Slim that there was a significant change in the Japanese mentality, worth taking advantage of.¹²⁸ Slim therefore ordered the pursuit, which would prevent the Japanese from successfully reorganizing further south.

The most telling example of Slim's rewards for having earlier created the intelligence structures that he needed are found in *Defeat Into Victory*. Between pages 378 and 383, Slim recounts all of the enemy analysis that he was able to conduct for his Phase III operations to the Shwebo Plain and Meiktila. This analysis reflected the extensive education that he had acquired about the Japanese during the previous two-plus years, which allowed him to use patterns much more effectively to "read" what the Japanese could and could not do. In calculating how many divisions he could get into the Shwebo Plain, he pondered this thought: "A year ago [in 1943] I would not have [even] looked at the proposal...[the difference was] the spirit of our own troops...in their experienced commanders."¹²⁹ This comment is indicative of one who has learned enough to be comfortable in his reading of patterns present.

Slim noticed an anomaly again while preparing to cross the Chindwin River for the battle at Shwebo Plain. His air reconnaissance told him that there was significant movement eastward from the presumed defensive positions (the Japanese were retreating to the east bank of the Irrawaddy River), and that defensive positions seemed to be suited for delaying operations only, not a defense to the death. Japanese ground resistance had had a mere token quality up to that point, even along easily defended terrain.¹³⁰ Slim hastily used this insight to order a change to his plans, sending a corps much further south

to seize Meiktila. The key point to note in Slim's use of patterns and anomalies is that neither was possible until Slim was able to rely on intelligence, which gave him situational awareness.

Singular evaluation. Did Slim use Klein's notion of singular evaluation, or did Slim consciously develop several courses of action and choose from among them? **The written evidence is clear: *he generated options.*** In his discussions surrounding each of the phases of his overall Burma campaign, he iterates several of the options available to him, and then reasons as to why he made the choice that he executed.^{131,132} Slim states clearly "What you have to do is weigh all of the various factors, recognizing that in war half your information may be wrong, that a lot of it is missing completely... You have got to weigh all these things and come to a decision as to what you want to do."¹³³ This is not the picture of leaders coolly developing a single course of action in the heat of the moment, a la Gary Klein's singular evaluation theory.

Perhaps it is too much to expect that any senior leader would follow Klein's singular evaluation notion at all. Klein's observation that a firefighter or tank platoon leader disregard options and instead formulate a single course of action relate to individuals whose decisions must be formed within *seconds* or *minutes*, lest they lose their entire operation. Slim's decisions, on the other hand, had to be formed over a much longer time, in *days* (if not *weeks*). Although the impact of his decisions was decidedly more important than that of the types of leaders that Klein describes, Slim did not have the urgency of the moment impacting on his *immediate* decision making.

Leverage Points. Although he did not use singular evaluation, Slim's modus operandi with respect to leverage points would make Gary Klein proud. Slim excelled in his use of leverage points, those "small things that make a large difference," and provide an exponential gain relative to the enemy. The small things are even more important when they are advantages that are significant *relative to what the opponent is doing, or can do.* "Slim also revealed one of the commander's highest gifts—the capacity to grip a battle which is manifestly running the enemy's way, and by fresh dispositions, so to alter the pattern of conflict that the enemy, in the end, is dancing to his own tune."¹³⁴ Slim's use of leverage points (beginning after the 1942 retreat) includes his efforts to address the health of his army, build roads through the jungle, use the rivers for resupply, use air movement and air resupply, institute jungle training, his selection of the battlefield of Imphal, his use of the monsoon season to conduct a pursuit, and his selection

of Meiktila as the Phase III operational objective. These were all a reflection of his post-1942 retreat lessons learned: that the coming struggle would depend upon training, supply, transport, and above all, morale.¹³⁵

Health and quick medical attention were key to morale. In order to keep his soldiers from succumbing to malaria and other jungle diseases, Slim enforced mandatory inoculations and medications. He also established special malaria hospitals right behind the front lines, thereby eliminating the long travel time from the front to a more rearward treatment facility. Relative to the Japanese, who had no similar facilities, his tactic paid off: in the early 1943 Arakan battles, there had been 120 cases of sickness for every battle casualty. By 1944, that ratio was down to 20 to 1. By 1945, it had dropped even further, to a mere 6 to 1.¹³⁶

The Burmese countryside was "...a wide belt of jungle-clad, precipitous hills, railless, roadless, and for six months of the year during the monsoon rains, trackless." In order to take advantage of the British mechanical transport available (which the Japanese did not possess, at least in the same quantity), Slim *built* roads in the jungle. Building roads in a country that lacked stone did not hinder Slim. Since without existing roads, it was impossible to import stone, the British built roads constructed of brick, and built brick kilns every twenty miles along the path of the desired road.¹³⁷ For the 1945 push to the south toward Meiktila, the British built a road in the harsh terrain of the Kabaw valley capable of all-weather traffic, constructing 123 miles of road in only four months.¹³⁸

Slim also mandated that the British use the existing rivers to their advantage (relative to the Japanese), due to the difficult and constricted Imphal – Kohima line of communication. The British literally built boats right on the Chindwin River out of dugout teak logs, eventually placing 541 of them into operation. The teak logs were hauled to the boat construction yards *by companies of conscripted elephants.*¹³⁹

The British leveraged their dominance in air transport to telling effect. During the Imphal battle, when the Japanese simultaneously threatened Kohima and Dimapur, Slim was able to rebound from his miscalculation by air transporting three divisions into the Dimapur area. Ground movement of those same divisions would have taken an untold number of days. The air movement of these division relative to the Japanese, who could only rely on ground movement, was the measure of victory for Slim in the Imphal –

Kohima battles; the Japanese had reasoned that Slim's forces in Arakan would be imprisoned there once the Japanese attacked to fix them in their positions. They had not counted on the British air transport factor.¹⁴⁰ British air resupply of forces surrounded by Japanese on the ground also contributed to the victory, which was part of Slim's strategy. Air resupply released the British from "the tyranny of the road as an umbilical cord between the base and the front line."¹⁴¹ British air resupply units began prepacking supplies to support *entire divisions*, and those supplies were successfully dropped, at one point sustaining most of four different divisions simultaneously.¹⁴² The wartime shortage of parachute silk, which spawned the invention of nylon stockings for women, did not stifle the British air resupply efforts. Instead, Slim improvised. The British made their parachutes out of jute.¹⁴³

Slim's insistence on improving training had immense leverage relative to the Japanese. His training regimen in patrolling and jungle familiarity forced the British soldiers to become more comfortable with their environment. When cut off by the inevitable Japanese enflanking movements, the British units simply hunkered down, assured of air resupply and relief by counterattacking mobile British columns. This had the effect of removing what heretofore had been a leverage point for the Japanese—the British reliance on roads for their resupply.¹⁴⁴ British patrol training also allowed them to collect better intelligence, as well as to begin to threaten the Japanese forces in the jungle, in what had previously been the Japanese' sanctuary.¹⁴⁵

The choice of Imphal as a battlefield represents a leverage point in itself. The British forces could afford to fight there defensively, with a line of communication (albeit constrained) running north through Kohima and Dimapur, because the Japanese, on the other hand, were fighting overland, cross-compartmentalized over two major rivers and a mountain chain. This gave the British a relative advantage in terms of the terrain.¹⁴⁶ But Slim combined that leverage with leverage of a different sort—the fact that the Japanese were overly aggressive in their offensives. Slim used the Japanese' momentum against them, remembering that during the Russo – Japanese War, the Japanese had always been prepared to throw in every reserve until they had won. Since the Japanese forces Slim had fought to date in Burma had appeared no different, he reasoned that although "This [aggressiveness] was a source of great strength to them... *properly taken advantage of...* in conjunction with their overweening confidence, [it would] be a fatal weakness."¹⁴⁷ As discussed previously, Slim lured the Japanese into the Imphal trap, at the end of their

long, tenuous line of communications, almost out of supplies and right before the monsoon season began—using their momentum against them. Slim then followed the Imphal success by leveraging his ability to pursue the fleeing Japanese with two divisions *during the monsoon season*, removing the ability for the Japanese to reorganize, and using air resupply during this pursuit to keep his two divisions fit.¹⁴⁸

Finally, Slim's choice of Meiktila as an operational objective leveraged that city's operational importance to the Japanese. Slim's objective in late 1944 and early 1945 was the total destruction of remaining Japanese forces in Burma. Meiktila was the key logistics base for the Japanese 15th and 33rd Armies. It contained supply and ammunition dumps, airfields, and hospitals, and was a nodal point for rail and road communications from the key sea port city of Rangoon to the south. By seizing Meiktila, therefore, Slim leveraged the fact that the Japanese *had* to counterattack, thereby giving him the attrition battle that he sought in order to destroy them.¹⁴⁹ To establish favorable conditions for the Meiktila seizure and subsequent battle, Slim cleverly leveraged deception of the Japanese, by leading them to think that Slim's original plan—to cross the Irrawaddy with an entire corps—was still in effect, which effectively fixed the Japanese into position while he maneuvered his other corps southward to Meiktila.¹⁵⁰

ANALYSIS AND SUMMARY

Sir William Slim's actions in the overall Burma campaign reflected his tendency to use patterns and anomalies to help him understand what was happening. However, his ability to do so depended directly on his ability to have the intelligence required to help form those impressions, something which he was unable to rely upon during the 1942 retreat. But just as importantly, his continued exposure to the Japanese so increased his experience that he was able to increasingly discern Japanese patterns and anomalies as operations progressed through 1944 and into 1945. His six page analysis of the Japanese intentions in the post-Imphal time period, relative to the limited references of his thinking about the Japanese earlier, directly reflects the confidence that he had steadily acquired up to that point. One must have significant experience, as well as the ability to exercise situational awareness, in order to use patterns and anomalies safely. Without that experience, one uses patterns and anomalies at one's risk.

Slim did not rely on Klein's notion of singular evaluation, however. He resorted instead to options generation, thinking through several courses of action before settling on the preferred course.

He showed a tremendous willingness to use leverage points in all aspects of his operations. When considering his entire kit bag of leverage points, however, one is struck by the fact that Slim did not simply identify existing leverage points—things which existed that the Japanese could also have taken advantage of (a key terrain feature, for example). Slim upped the ante with several of his leverage points, like road and riverboat construction in a most inventive way: *he created them*. It is certainly one thing to be able to identify the leverage points in an existing “system,” and to operate off of those leverage points, in zero-sum game fashion, in a way that leverages a relative advantage over an opponent. *It is another thing entirely to add leverage points creatively to that system, breaking the bond of the zero-sum game.* This point is most important for those who aspire to operate according to Gary Klein's theories.

Two other aspects of Sir William Slim are worth mentioning at this point. They have to do with his method of planning operations, and his work ethic. U.S. Army Field Manual 101-5, *Staff Organization and Operations*, in conjunction with Field Manual 134-130, *Intelligence Preparation of the Battlefield*, intimate that U.S. Army commanders and staff planners, in considering how to operate against an enemy force, consider what the enemy's possible options are against the friendly force, before devising options to counter that enemy force. This planning framework is decidedly *reactive*. Rather than impose operations upon the enemy, this theoretical framework ensures that U.S. Army commanders and planners view everything from the enemy's perspective *first*. That is not to suggest that the enemy's perspective is unimportant—it is not. Rather, the friendly force commander or planner should proceed in a manner which allows him to consider first what he wants to do to the enemy, and *then* to consider how the enemy's options might frustrate those intentions.

Slim reveals his own thought on this issue during a pause in his description of the preparations for the Arakan battles (see endnote 86). In his discussion, Slim notes that he developed his intentions personally, before getting anyone else involved. He then discussed his intentions with his senior general officer assistants, soliciting their feedback, developing with them, in broadest outline, at least two (and preferably three or four) options at how to strike the enemy. Only then did Slim turn his thoughts over to his more junior planning staff, having them work up all of the details, advantages, and disadvantages. Once

that was completed, he reviewed it with them. *At that point, he then turned to his intelligence officer and asked what the likely response from the Japanese would be. As such, he planned his operations taking his own intentions into consideration first, only afterward considering the opponent's response.*¹⁵¹ U.S. Army commanders and planners would do well to study this method, in an attempt to become more proactive (than reactive) in their planning and operations.

Finally, Slim's work ethic deserves attention. In the finest tradition of the British Army, Slim (wisely, in this author's opinion) abhorred working long hours, preferring to stay fresh by taking a good amount of leisure in his daily constitutional:

I had seen too many of my colleagues crack under the immense strain of command in the field not to realize that, if I were to continue, I must have ample leisure in which to think, and unbroken sleep. Generals would do well to remember that, even in war, 'the wisdom of a learned man cometh by opportunity of leisure.' Generals who are terribly busy all day and half the night, who fuss around, posting platoons and writing march tables, wear out not only their subordinates but themselves. Nor have they, when the real emergency comes, the reserve of vigour that will enable them, for days if necessary, to do with little rest or sleep.

Slim's thoughts presage Craig Loehle's principles of "strategic thinking," discussed earlier in Chapter II. U.S. Army officers, given to never-ending days with their noses at the grindstone, ought to give pause to consider Slim's words. Before disparaging his thoughts, they also ought to consider that Slim made these comments against the backdrop of his arduous, but successful Burma campaign, as opposed to the conditions that they might currently face. Spotting patterns and anomalies, and generating the creative energies required to divine leverage points, do not come easily to those who are burned out in the infinite detail of everyday activities, unable to see the forest from the trees themselves. It is not as important to do things right, especially at higher levels of responsibility. *It is important to do the right things. Being able to discern what the right things are argues for brainpower that is relatively fresh and able to see the larger context for what it is, understanding what is important, and what is not.*

That is the story of Sir William Slim's exploits in Burma, as viewed through the prism of several of Gary Klein's sources of power. Slim, however, is not the only individual who has faced incredible adversity and risen to the top. Some thirty years later, a Harvard dropout by the name of Bill Gates would use a different logic to rise to the top of the computer software industry, in the process becoming the richest man in the world by the age of forty. His story follows.

CHAPTER IV – THE MAGICIAN OF MICROSOFT

Microsoft has been the single greatest beneficiary of inept competition of any company in the world.

Former Microsoft executive Vern Raburn

In the world of computer software development, those that win strive to be first, lest they play “catch-up.” Bill Gates and Microsoft have been first repeatedly—the first to market an industry-standard version of the BASIC language, the first to get a standard, quality operating system (MS-DOS) to market, and the first to put spreadsheet software into foreign markets.¹⁵² Gates himself admits that he has been too busy to write his own autobiography, which complicates somewhat a study of how he thinks.¹⁵³ He has been largely successful, however. The world’s youngest billionaire at thirty-one years of age, his personal fortune amounted to \$36.4 billion only eleven years later.¹⁵⁴ Microsoft has grown from a two-man company in 1974 to a 20,500-employee company in 1998, with sales of \$8.8 billion.¹⁵⁵ A large number of these employees work in Microsoft offices in fifty-eight countries. Between 1,200 and 3,000 of the Microsoft employees themselves are millionaires, thanks to Microsoft’s stock prices; three are billionaires.¹⁵⁶

As a youngster, Gates seemed emotionally immature, overly talkative and too sarcastic.¹⁵⁷ His budding, creative mind was uninhibited, seeing infinite opportunity instead of limits.¹⁵⁸ He possesses an intense ability to focus on problems at hand, which in Microsoft parlance has come to be known as “going hardcore,” or “drilling down to the essentials.” He is also known for his ability to “multi-task,” to be able to do several things at once.¹⁵⁹ He is driven, in part, by experiences of other companies with which he has worked, remembering how they fell on hard times. When working with TRW, for example, he learned how not to run a business. TRW seemed to be constantly throwing money and people at problems, but not actually fixing them.¹⁶⁰ He also remembers how IBM, the computer hardware giant for so many years, suffered when upstart DEC created the microcomputer, taking IBM’s market share away—indicative of IBM getting lazy and resting on its laurels.¹⁶¹ Gates works harder than anyone else, resolving to keep Microsoft competitive and on the leading edge. He prides himself in his “seven-hour turnaround,” working

until early in the morning, taking only that much time needed to go home, eat, shower, and sleep before returning to work.¹⁶²

What set Bill Gates apart from everyone else in his field, however, was his tremendous *vision*, his ability to understand what existed, and to comprehend *what could be*. Gates realized in the early 1970's *while in college* that the emerging computer industry would eventually produce computers for use by individuals in their homes. If computing could be made inexpensive for everyone (by that time period's standards), people would need computer software to be able to exploit their computers for individual uses. If he could get people to use his software, he could get rich.¹⁶³ "We had ideas that the giants of the time missed. We're always thinking about what we have missed that could keep us on top."¹⁶⁴ Gates' vision proved correct. Twenty-five years later, more than 80 percent of the world's computers run Microsoft software.¹⁶⁵

This chapter discusses Gates' rise to prominence through three major events: the first significant business transaction with the Micro Instrumentation and Telemetry Systems Company (MITS), Microsoft's business deal with IBM to produce MS-DOS, and Microsoft's venture into the world of Graphic User Interfaces (GUI), which resulted in Windows. After discussing what happened in each of these events, the discussion turns to an analysis of Gates' use of patterns and anomalies, singular evaluation, and leverage points. The chapter ends with an analysis and summary section.

GATES AND MICROSOFT – WHAT HAPPENED

Microsoft and MITS. In December of 1974, while a student at Harvard, Gates saw an advertisement in Popular Mechanics magazine for the Altair 8800, one of the first build-it-yourself personal computers. Prior to 1974, computing had largely been the province of IBM and others, mainly in the mainframe and microcomputer industry. Personal computers were a novelty. The Altair 8800 lacked software to make it do anything, however; it was merely a machine, devoid of software personality. Gates and his best friend, Paul Allen, the two of which constituted Microsoft at that point, realized quickly that at the onset of the personal computer craze, if they were not able to write software for MITS and the Altair 8800, that the world would pass them by. They quickly contacted Eugene Amdahl, MITS' owner, and

offered to write a version of BASIC for the Altair 8800 (BASIC is one of the software languages that Gates and Allen were good at writing).¹⁶⁶

Gates realized that when he wrote BASIC for different computer companies, a lot of work was required to modify the language for each computer.¹⁶⁷ He developed a strategy to write a version of BASIC that would work on more than just one computer, thereby making himself more indispensable to computer companies at large, since, he reasoned, several other companies would be joining the personal computer market. In addition to making his version of BASIC compatible with many other computer manufacturers, he also sought to offer his BASIC at an inexpensive price, to attract customers.¹⁶⁸ Writing BASIC for the Altair 8800 was significant for the computer industry—practical applications like accounting and statistics software could be developed as a result.¹⁶⁹ Gates' BASIC was so well written, it would dominate the market for the next six years.¹⁷⁰

Microsoft's relationship with MITS suffered, however. Microsoft had originally negotiated with MITS to provide MITS with an exclusive, worldwide license to the Microsoft BASIC software language for ten years. MITS had the right to sublicense BASIC to third parties. In effect, this meant that Microsoft placed the responsibility and control of selling its BASIC language directly into MITS' hands.¹⁷¹ Gates quickly realized that MITS was selling many more Altair 8800 computers than his version of BASIC, an indication that software pirates were copying his software instead of purchasing it legally.¹⁷² An arbitrator eventually decided on Microsoft's behalf, declaring that MITS had reneged on its part of the bargain.¹⁷³

Bill Gates learned several valuable lessons in his first major interaction with the computer hardware industry. First, he resolved never again to allow a computer manufacturer to have control over the sale of his software product. Instead of expecting a computer company to sell his software for him, Gates insisted on selling his software *to the computer company itself*, thereby ensuring a specific amount of money for his product. Thereafter, as far as he was concerned, the computer company could give his software away for free—he had made *his* money in the deal. He also insisted on not granting a computer company exclusive rights to his software, making sure that his contractual agreements stipulated **non-exclusivity**, meaning that Microsoft could sell its software to anyone, regardless of the initial contract and product. This placed Microsoft in the controlling position, as opposed to the hardware manufacturer.¹⁷⁴ Gates confirmed his instincts of garnering market share by providing software at the lowest possible cost,

bargaining for volume sales, and in the process, making himself overly-attractive to the market at large. Gates and Microsoft did not want hardware manufacturers going elsewhere for their software. Gates wanted those manufacturers to select Microsoft software as a “no-brainer.”¹⁷⁵ Finally, Gates began to display a high degree of risk in forging his strategy to carve out market share: for each new project, promise the best product in the world, get the contract, go “hardcore,” and *then* write the code. He correctly understood that getting the business first was paramount, after which of course, he must be able to deliver as promised. He would begin a pattern of relentless, unsolicited lobbying efforts to get business.¹⁷⁶

Microsoft and IBM. On July 21st, 1980, the unthinkable happened: computer giant IBM called then-emerging Bill Gates and Microsoft, wanting to know if Gates could assist IBM as it prepared to take the plunge into the rapidly-expanding personal computer market.¹⁷⁷ IBM was in a bad way in early 1980, having ignored the personal computer portion of the industry for too long. In order to quickly market a competing personal computer, IBM was willing to depart from a long-held strategy of doing everything itself. Instead, IBM recognized that it had to use others’ products off-the-shelf, in an “open architecture” (as opposed to a closed, proprietary architecture, meaning that everything that it developed could not be used with other companies’ products).¹⁷⁸ Its main competitor, Apple Computer, had fostered the growth of software companies through open architecture. This approach took advantage of the competitive nature of the industry, by spurring business initiative to explore multiple avenues in software applications, in conjunction with a well-understood (open) hardware frame.¹⁷⁹ Gates realized that IBM’s open, personal computer architecture would eventually lead to compatibility with other hardware companies, such that a standard, commonly-used **operating system** could become the common thread between all of those like-computers. Similarly, having a common operating system would mean that all of the software companies could develop their software applications to one, single operating system, rather than developing individual, more expensive versions of each application for each different computer manufacturer.¹⁸⁰

Jack Sams, IBM’s leading negotiator, visited Microsoft with a small IBM team in the summer of 1980. In spite of the disheveled office environment that they found upon arrival, and the youthful appearance of Bill Gates (who they thought was the “office boy”), by the time he had been with Gates for fifteen minutes, Sams realized that Gates “...had the most brilliant mind that I had ever dealt with.”¹⁸¹ IBM and Microsoft signed a contract in November of 1980, allegedly providing Microsoft an advance of

\$100,000, \$200,000 for all adaptation work, \$400,000 to write what would become MS-DOS (Microsoft Disk Operating System), and a royalty of \$1 for each copy of MS-DOS sold per IBM computer, as well as \$50 for every computer sold with each of the four languages that Microsoft would write for them. This was a significant achievement for a five-year old company.¹⁸²

True to form, Gates had managed to acquire a contractual agreement without having the goods in hand. Microsoft scrambled to write MS-DOS. To do it successfully, Gates and Paul Allen turned to a local software engineer, Tim Patterson, who had previously developed an operating system called QDOS (Quick and Dirty Operating System). They bought the rights to QDOS (the purpose of which was unbeknownst to Patterson) for \$50,000.¹⁸³ In its haste to thrust itself into the emerging personal computer market, IBM also agreed to fund most of MS-DOS' development costs, and then gave Microsoft the right to license MS-DOS to third party hardware manufacturers—a result of Microsoft having learned the lessons of non-exclusivity.¹⁸⁴ MS-DOS, when developed, offered an easy adaptation mechanism for existing software applications written in a competing operating system called CP/M; this meant that software developers whose applications were written for CP/M were encouraged to “migrate” over to MS-DOS, again reinforcing Gates’ instincts for making himself indispensable.¹⁸⁵

Royalties from the IBM - MS-DOS venture would be estimated at \$200 million a year for several years. In June, 1986, Microsoft announced that one-half of its annual revenue of \$60.9 million came from sales of MS-DOS.¹⁸⁶ “IBM grossly underestimated the drive and stamina of Bill Gates. IBM’s agreement to give Microsoft royalties for every IBM PC sold with MS-DOS proved to be a very costly mistake.”¹⁸⁷ “Every single PC shipped by IBM would have MS-DOS installed. For Microsoft, it was the perfect Trojan Horse.”¹⁸⁸

After the IBM deal, Gates quickly solicited business with the other emerging personal computer manufacturers, seeking to corner the market in operating systems. He succeeded: MS-DOS became the world’s standard.¹⁸⁹ Microsoft also profited from all of the other emerging personal computer “clones,” who sold their machines with MS-DOS too.¹⁹⁰

Microsoft and Windows. Gates and Microsoft did not rest on the laurels of their newly-made wealth. In August of 1981, Gates witnessed a prototype of Apple Computer’s Graphical User Interface (GUI), which differed significantly from the IBM and IBM-clone personal computer method of user

interfacing.¹⁹¹ Apple's GUI, Gates agreed, was a much more effective way for humans to interact with computers, because it proceeded on the assumption that people learned from (and used) metaphorical pictures (like file folders and trash cans) much easier than with MS-DOS, which required memorizing a myriad number of unconventional acronyms and keystrokes to be effective.¹⁹² Gates, reasoning (and maneuvering) to make software the central feature of personal computing, realized that making that software even easier to use would only add business to his company.¹⁹³ Gates also reasoned that with increasing hardware capability, the concomitant increase in computer memory would allow those computers to run GUI effectively. Whoever produced the best GUI would win the war.¹⁹⁴

Gates and Microsoft were not in the lead, however. With Apple Computer's Macintosh (armed with GUI) still a year away, Gates was completely surprised upon discovering Visi-On, a computer program produced by VisiCorp, unveiled at a 1982 computer convention. Visi-On was an instant threat to Microsoft and its own GUI efforts, in terms of being first. Luckily, Visi-On was still in development, and Gates had time to react. React he did—Microsoft went “hardcore,” began promising a better GUI-based software program to all of the hardware companies, and then threw itself into actually writing it.¹⁹⁵ Gates' ability to focus solely on his GUI program—now named “Windows”—suffered from all of the other business ventures that he was involved with. Concurrently, he had to keep Apple happy, as he was developing several software applications for them, while IBM needed to be soothed repeatedly, lest they drive the computer hardware market away from MS-DOS, Microsoft's cash cow.¹⁹⁶ Gates' complexity, however, did not deter him from succeeding with Windows' development.

Microsoft formally announced Windows in 1983. It was billed as an effort to bring graphical computing to the IBM PC.¹⁹⁷ Gates' modus operandi at this point had become commonplace for Microsoft: promise the world early, get something on the market, then fix all of the bugs, all the while putting a maximum effort into media relations to create a hype for the promised product. Get the contracts early, and then do the work. The initial Windows demonstration was a smoke-and-mirrors product, designed solely to convince hardware manufacturers that it would work convincingly on their machines.¹⁹⁸ Windows, however, would be such an extended version of this Microsoft routine that competitors termed the elusive product “vaporware,” while Gates earned the moniker “the Viscount of Vapor.”¹⁹⁹ An early project manager for the Windows endeavor, Scott McGregor, was dumbfounded when he discovered that no

specification existed for Windows when Gates had made the formal announcement, nor did one ever exist for the first two years of development. Windows' progress kept getting delayed as a result, pushing delivery out into the future.²⁰⁰ Although Windows version 1.0 finally shipped in the fall of 1985, it took Gates almost *nine years* to get a good version of Windows on the market (1992's release of Windows 3.1).²⁰¹ Gates spent over \$3 million when unveiling the preceding version, 3.0, at a lavish public promotion in May of 1990. Yet that version sold over four million copies.²⁰² Meanwhile, the threatening competitor, Visi-On, died a quick death due to its closed, proprietary architecture, which would potentially cost software developers significantly more money to develop applications for.²⁰³

Gates' gambit paid off—he won the GUI race. Most of the computer hardware manufacturers and software applications developers stood behind Gates and his Windows project, not because they loved him, but because they appreciated his insight that one, single standard that everyone could relate to would save them all money. It made perfect business sense.²⁰⁴ What follows is a discussion of Gates' evident use of patterns and anomalies, singular evaluation, and leverage points.

PATTERNS AND ANOMALIES, SINGULAR EVALUATION, AND LEVERAGE POINTS

Patterns and Anomalies. Bill Gates loves to play poker. In his book, *On the Road*, he recounts his tactics in college poker games, during which he intimates how he would collect intelligence from the other players at the table on how they played—how they bet, who was bluffing, etc. He would take all of that into consideration in divining how he would play relative to that group, an example of Gates using patterns and anomalies to play the game “at a higher level.”²⁰⁵

Gates demonstrated a use of patterns in his early Microsoft years, understanding the capabilities of the different silicon computer chips and knowing which ones would support different types of applications. Gates recognized, for example, that the 8088 chip that IBM planned to use for its new PC would be demonstrably more capable than the 8008 chip that had been resident in the Altair 8800. Based on this

recognition of patterned information, Gates jumped at the IBM offer to write MS-DOS, knowing that IBM's PC with an 8088 chip would be powerful.²⁰⁶

Gates also displayed an ability to use anomalies in his realization that MITS had not sold as many versions of Microsoft BASIC as its Altair 8800 computers, thereby reneging on its contractual agreement. Gates used this knowledge to break the contract and enter into arbitration, eventually freeing himself from MITS' bondage.²⁰⁷

Gates used patterns to discern the immense paradigm shift surrounding the IBM deal. Previously, the pattern of software development had been to write software for specific computers, whose closed architecture "protected" the products from other's investigation and influence. Gates realized that IBM's adoption of an open architecture would allow his software to propel him to center stage, and therefore took advantage of the opportunity to work with IBM.²⁰⁸

Finally, Gates has been accused by many in the industry of creating an "intelligence network," which is true. He maintained amicable relationships with many computer industry magnates, in spite of the intense competition. This allowed him to know what was happening, and to be able to spot patterns and anomalies as they emerged, giving him the opportunity to beat the competition.²⁰⁹

With respect to Sir William Slim, however, Gates' use of patterns and anomalies seems to be less-well developed. There are two possible reasons for this. First, Gates might not have *had* to rely on patterns and anomalies as much as Slim, since Gates was much more in the lead relative to his competition. Slim began his Burma experience reacting to the Japanese, and fought with the Japanese toe-to-toe throughout his endeavor. Gates, on the other hand, managed to get in the lead and never looked back. He was out front, driving the rest of the field, not having to "read and react" to it. Patterns and anomalies, to him, were not as vital to survive. A second explanation as to why Gates seems to use patterns and anomalies less than Slim is simply this—Gates remains the competitor, whose "struggle" with his competition is not yet complete. Slim, on the other hand, wrote of his thought processes after he had vanquished his foes. Slim had nothing to lose. Gates has much more to lose, perhaps requiring him to be more circumspect in revealing his methods. He admits that he has not yet produced his autobiography, which corroborates this thought.

Singular Evaluation. Does Gates resort to singular evaluation, or does he rely on the generation and comparison of options? With the caveat of Gate's perceived circumspection perhaps concealing the true answer, **the evidence available suggests that Gates, like Slim, relies on options.** Gates struggled in considering what to include in the MITS BASIC, with "...hundreds of agonizing decisions [to make]," not indicative of one who calmly uses intuition to make a singular evaluation.²¹⁰ Similarly, he struggled with whether he could commit to writing MS-DOS for IBM, in conjunction with all of the other software deals with which he was involved. Laying on the floor of his headquarters, he screamed out "Should I do this? I don't know. It's a good relationship...I don't know." His reasoning of the different options convinced him that he could.²¹¹ Gates decision to branch out into software applications (instead of just writing languages and operating systems) again surfaces his use of options, instead of singular evaluation. When developing Microsoft Word, he agonized over what features to include, and what to discard.²¹²

Gates' use of options on an even higher plane surrounds his strategy of pursuing *multiple* courses of action, even when some of those courses of action seemingly acted at cross-purposes. Gates became a master at burning both ends of the candle. For example, he offered to help Apple Computer, a Windows competitor, by writing software applications for the Macintosh, because it would assist Microsoft in gaining market acceptance of a software application that could then be retroactively fitted to Windows.²¹³ Gates' method of pursuing multiple courses of action helped ensure that he would not be left out of any emerging aspect of the software market, and would thus remain the dominant software power.

Leverage Points. Gates' most amazing trait, however, is his ability to identify and take advantage of leverage points. In this aspect, he resembles Slim. **But whereas Slim *created* leverage points, Gates managed to link the aspects of several of his leverage points together, in effect *synergistically* "leveraging" the leverage points, through a process that he describes as a "positive feedback cycle."** This section first describes several of Gates' "simple" leverage points, before proceeding on to a discussion of his positive feedback cycle and its corresponding leverage points.

Gates was adept at leveraging the ability to emulate different computers in order to write software languages for them. In the early days of software development, Gates rarely could obtain access to a particular computer, for which he desired to convert a language. Instead, he ingeniously developed a way

to make a given computer emulate the desired computer, allowing him to write his language and then solicit business.²¹⁴

Gates also developed a strategy of not reinventing the wheel—of taking advantage of existing products and ideas, and making them work better.²¹⁵ Critics charged Microsoft with spotting good work and converting it for its own use, “...embracing anything that’s popular, and then coming out with extensions [to it].”²¹⁶ Microsoft’s acquisition of QDOS, for only \$50,000 and at a time when it had promised IBM MS-DOS with nothing in hand, was incredible. The resulting product thrust Microsoft to the center of the software market, eventually running on eighty percent of the world’s computers.²¹⁷ In order to continue to make itself indispensable to IBM during the MS-DOS negotiation, Microsoft went out and bought the rights to five additional software applications, and then turned around and sold those rights to IBM for a profit.²¹⁸

Speed of action became a Microsoft leverage point. Gates realized that getting to the market first with a workable product was better than getting there second. Refinements could always be made later.²¹⁹ Part of Microsoft’s success in getting to the market first was the “preemptive strike,” the computer industry’s version of a red herring, wherein one company seeks to steal the limelight from another company’s imminent announcement of a developing product. When Microsoft learned that VisiCorp was about to announce Visi-On at a computer convention in the fall of 1983, Gates preempted that announcement with a media blitz on Windows. Visitors to that convention were greeted with pictures, posters, lapel buttons, cocktail napkins and promises of Windows wherever they looked.²²⁰ The “vaporware” aspect of Gates’ strategy, combined with his uncanny success, furthered his preemptive strike tactic by promoting a “FUD factor”—fear, uncertainty and doubt—in the minds of his competitors, deterring them in some instances from proceeding with their own plans.²²¹ It was Gates’ ultimate poker bluff.

Gates learned from the exclusivity mistake of his MITS deal, insisting on non-exclusive contractual arrangements thereafter. His IBM – MS-DOS negotiation allowed him to further license MS-DOS to the other hardware manufacturers, placing him at the center of activity and establishing a common thread among various computers.²²² **Significantly, this non-exclusive leverage point acted as a catalyst in driving what Gates would call a “positive feedback cycle”: his MS-DOS was used by several IBM**

competitors to enable them to market their own versions of the IBM clone more cheaply. Their demand for MS-DOS then drove Microsoft's business up. This corresponding upswing in business drove Microsoft's fledgling software applications division out into the open, where it could thrive. More Microsoft software, guaranteed to work on *any* IBM or IBM clone computer (with the already-marketed MS-DOS), was eagerly accepted by the public, increasing demand for those IBM and IBM computers, completing an iteration of the cycle, only to begin again.

Gates' magic ability to work synergistically several leverage points together in conjunction with this positive feedback cycle reflects his ultimate genius. First, he made MS-DOS the best available product. He then helped other software applications companies write their own applications products, in order to take advantage of MS-DOS (another example of his working at seemingly cross-purposes), fueling increased demand and acceptance of MS-DOS by the general public, which naturally wanted to take advantage of all of the emerging software products. Finally, he made MS-DOS available to computer companies inexpensively—a deal that they could not refuse.²²³ “What Gates understood that others did not was that in the computer business, market share is self-perpetuating.”²²⁴ MS-DOS had the effect of making all of the applications and languages independent of the hardware, establishing in the process a controlling monopoly of sorts.²²⁵ Gates himself knew, during the IBM negotiating period in 1980, that the MS-DOS deal with IBM would become a “...fulcrum for enormous leverage toward a ‘natural monopoly.’”²²⁶ In order to ensure MS-DOS’ widest acceptance early, Gates included a free sample demonstration diskette in every subscription copy of PC Magazine’s October 1983 edition (one hundred thousand copies total).²²⁷ His strategy ultimately worked. Microsoft now has operating systems offered by over nine hundred companies, all of whom have agreed not to allow modifications to it, allowing anyone to write additional applications with a guarantee that the application will work universally.²²⁸

MS-DOS was not the only significant player in his web of synergistic leverage points. His insistence on open architecture helped fuel the positive feedback cycle, allowing hundreds of software companies to create single products which would work on numerous machines.²²⁹ In spite of earlier pledges not to get involved with hardware, he actively marketed an early version of the computer mouse in order to spur interest in his GUI product, Windows.²³⁰ Microsoft’s expansion into the software applications sector (vice simply writing languages and operating systems) fueled increased interest in his products at

large, for IBM and IBM-compatible machines, as well as for Apple Computer.²³¹ These products were marketed not only in the United States, but overseas as well. Gates diversified through multiple courses of action, even though they sometimes appeared to act at cross-purposes. His overseas gamble paid off; today, fifty-eight percent of Microsoft's total revenue is generated outside of the United States.²³² Finally, Windows' successful entry into the market added fuel to an already roaring fire, in terms of allowing Microsoft to fight its way into a leading position in the software applications sector.²³³ Windows acceptance among the public (eighty percent of PCs use a Windows product) provided Gates with additional negotiating and marketing muscle, generated huge sums of money, and provided unique opportunities to Microsoft to bundle its own software into each new computer sold.²³⁴

ANALYSIS AND SUMMARY

Bill Gates is the leader of the parade, because he sees where the parade is going and he gets in front of it.

Stephen Manes

Bill Gates displayed a willingness to use patterns and anomalies to ascertain what was happening in his surrounding environment. His use of those patterns and anomalies, however, was significantly less than Sir William Slim, probably due to the differing nature of his position relative to his opponent. **He did not use singular evaluation, preferring instead to develop and choose among options.**

Gates' and Microsoft's success is tied to long-term vision, and synergistically leveraging several points to get into the market lead, and then staying there. He insisted on fast-feedback loops inside his company, as well as externally—to the consuming public. In so doing, he ensured that his products would reach the market quickly, taking advantage of the requirement to speedily beat the competition. His success is also tied to his shrewd business acumen and negotiating savvy. His shrewdness allowed him to maneuver successfully into the controlling position in the computer industry, making himself and his products indispensable. "Without MS-DOS, your machine might as well be a doorstop."²³⁵ His ability to synergize several leverage points demonstrably increased his relative position of advantage vis-à-vis his competitors. His early expertise in writing computer languages spawned an IBM deal to create MS-DOS,

which then led to applications programs and Windows. All eventually reinforced one another. Gates won the war of control in the 1980's and 1990's, and it remains to be seen whether he can continue to dominate into the 21st Century. Finally, Gates successfully diversified into numerous courses of action, covering several bases, ensuring that for every failed attempt in a new venture, something else was sure to succeed.

Thanks to Gates' management and leadership style, Microsoft bloomed as a company through the aspects of what theorist Peter Senge would call a "learning organization." Striving for a campus-like atmosphere on the grounds of Microsoft, Gates fostered systems thinking, personal mastery, shared vision and team learning, all of which Senge finds in companies which promote the best collective output from their individual members.²³⁶ Microsoft is fanatical about learning from its past mistakes.²³⁷ The company members spend a lot of time *sitting and thinking*, which is reminiscent of Sir William Slim's earlier admonition.²³⁸ Gates also readily admits that he is wrong on many occasions, but because he has so many irons in the fire, he can *afford* to be.²³⁹ Eliot Cohen and John Gooch, authors of *Military Misfortune*, describe serious failures in military history as failures to anticipate events about to happen, failures to learn from events that have transpired, and failures to adapt to a situation as it inevitably changes.²⁴⁰ Gates and Microsoft serve as a living example of the *antithesis* of Cohen and Gooch's theory, superbly anticipating, learning, and adapting.

Gates' creative intelligence also promotes the learning organization aspect of Microsoft. He excels at fostering innovation. He exhibits the traits of an *adaptive* thinker—one who can flexibly and quickly think out-of-the-box on every occasion.²⁴¹ Microsoft tolerates eccentric behavior from talented, creative employees.²⁴² Conflict is at the heart of Gates' decision making style—his kind of pressure tactics, screaming with other Microsoft employees during heated debates, tends to bring out the truth of the issue. Gates loves employees who stand up to his domineering personality.²⁴³

In spite of his overwhelming success, Gates was far from infallible, however. He would be the first to admit that he was not always correct on occasion. He initially insisted that Microsoft would only write software languages for computer hardware companies. He was suckered into an exclusive contractual arrangement with MITS, before learning the perils of that kind of agreement. Once he was prompted to enter into the operating system market, he then insisted that Microsoft stick to languages and operating systems, ignoring the expanding market in software applications programs.²⁴⁴ He almost surrendered the

GUI initiative to Visi-On, and luckily made up for lost time when VisiCorp dallied in its production of the first IBM-based GUI program. And most recently, he claims that his biggest mistake was not getting involved in the expansion of the Information Superhighway, the Internet.²⁴⁵ Yet, for each miscue, Gates' ability to react, to foresee what should have been, and to promise the world with nothing in hand allowed him to climb back into the driver's seat.

CHAPTER V – CONCLUSIONS AND RECOMMENDATIONS

The goal is not to predict what may happen, but to figure out the future you can make happen. It's about winning by changing the rules.

Gary Hamel, *Competing For The Future*

Magician: One whose skill or art seems to be magical.

The American Heritage Dictionary of the English Language

This monograph began by juxtaposing the simple life of a single football player with the more demanding complexity faced by that player's coach, and the relative difficulties each had in making decisions. It posited the notion that, while a single football player might be more of a scientist than an artist, that his coach had to rely on a more artistic than scientific thought process in order to succeed. The introduction chapter then posed the difficulties faced by senior level decision makers in using rational choice strategies in situations that Gary Klein has categorized as "naturalistic." The intent of the monograph was to explore whether there were alternatives to rational choice strategies that senior leaders, ascending the ladder of rank and responsibility, could use in naturalistic decision making environments, as a means to propel themselves from the scientific end of the polemic scientific - artistic continuum toward the artistic pole. It used three of Gary Klein's sources of power—patterns and anomalies, singular evaluation, and leverage points—as a basis for determining to what degree two eminently successful senior leaders made their decisions, and to ask rhetorically if these three sources of power could possibly offer a "bridge" on the scientific – artistic continuum to facilitate the prospective senior leader's movement along it.

Did the decision making methods used by Sir William Slim and Bill Gates correspond to the theories espoused by Gary Klein with respect to patterns and anomalies, singular evaluation, and leverage points? Without question, the evidence showed that neither Slim nor Gates used singular evaluation, choosing instead from among different options open to them. Perhaps they refused to rely upon singular evaluation because they could not *satisfice*. (To be fair, neither Slim nor Gates relied *exclusively* upon rational choice strategies either—which might account for their overcompensating use of leverage points.)

To a limited extent, the evidence showed that Slim and Gates could appreciate and decide based on different patterns and anomalies that they were able to recognize, once they had some degree of reliable intelligence surrounding their decisions. Overwhelmingly, both Slim and Gates relied upon leverage points as a source of power in their decisions. Slim became a master at *creating* leverage points; Gates, a master at *leveraging the leverage points* through synergy.

Were either Slim or Gates a magician? By the definition reflected in the epigraph at the beginning of this chapter, one would think so, at least at a distant glance. From close up, however, both appeared to have a more practical than magical ability to act within their naturalistic environments. In addition to their decision making prowess, both Slim and Gates possessed a tremendous ability to envision the current state, the desired future state, and to concoct a way to move from one to the other at least cost to himself. Both possessed incredible willpower in prosecuting their decisions. And neither Slim nor Gates was infallible: both made numerous mistakes, either missing a prompt decision, or failing to see an opportunity. Both, however, adapted quickly, decided on a course of action, and resurrected their winning ways before the opponent had a chance to seal his victory.

As a result of this monograph and its attendant research, the following recommendations appear to be in order. First, although Gary Klein's ideas seem to resonate with prospective military planners and aspiring senior leaders, one must not take all of Klein's ideas too literally. Potential planners may be enamored with Klein's notion of singular evaluation, but for the wrong reasons. Planning is difficult. Klein offers an escape from a planner's Sisyphean chores by dangling a luring alternative of choosing the first course of action which comes to mind, rather than thinking completely through the problem. As Slim and Gates have shown, at least at the highest levels, such notions are fantasy. Their complexity is too great to rely upon the first thing that strikes one's fancy. Singular evaluation does have a place with junior leaders—sergeants, lieutenants, and captains, all of whose decisions in combat routinely must be made within seconds and minutes. *Yet it is ironic that at these junior levels, where the immediate decisions demand the highest levels of experience, that in fact the junior leaders making those decisions have the least amount of experience to rely on (and therefore a limited ability to rely on patterns and anomalies).*

This requirement to expose junior leaders exponentially to the situations that they will be required to deal with in combat should not be taken lightly. A second recommendation for the Army would be to

ruthlessly exploit existing and developing technologies, available training time, and resources, to repetitively expose junior leaders to the types of naturalistic decision making environments that they will face in combat, in order to allow them to develop the experience needed to rely on the depths of their patterns and anomalies ***to make those crucial, immediate decisions correctly.*** The approach currently taken is devoid of pattern and anomaly cognition, and therefore misses the point completely. The Army must understand, as well, that there is no time to waste—combat is getting more, not less, complex. The **confident** use of patterns and anomalies by junior leaders, as well as intuition at large, will be even more important in a more complex future than it is now, especially as an alternative to rational choice strategies.

The Army should not stop there, however. Truly understanding the larger context of intuition—that part of intuition beyond what patterns and anomalies provide—should be a goal for the Army. Once understood, inculcating that understanding within both the officer and noncommissioned officer ranks is imperative. Education and fostering of a well-developed understanding of intuition should begin at the earliest stages of the Army career—for *both* officers and soldiers.

Finally, the Army needs to widen its collective understanding of **creative** and **critical** thinking, as well as its understanding of **systems** thinking. All three of these areas stand to further illuminate the complexity with which the Army must now contend, and will continue to contend in the foreseeable future. Open-minded approaches to problem solving, understanding how each problem to be solved exists within a nested system of other variables, and artistic solutions to problems once truly understood—all would facilitate keeping the Army of the twentieth century to the forefront of its competitors well into the twenty-first century.

The alternative is unthinkable.

ENDNOTES

¹ Gary A. Klein, *Sources of Power: How People Make Decisions* (Cambridge, Massachusetts: MIT Press, 1998), 127.

² Ibid., 10, 261.

³ Ibid., 29.

⁴ Ibid., 103.

⁵ Ibid., 127, 262-264.

⁶ Ibid., 128-129.

⁷ Ibid., 12.

⁸ Ibid., 10-11.

⁹ Ibid., 30, 259.

¹⁰ Ibid., 4-6.

¹¹ Ibid., 17.

¹² Ibid., 30.

¹³ Ibid., 31.

¹⁴ Ibid., 35.

¹⁵ Ibid., 152.

¹⁶ Ibid., 149.

¹⁷ Ibid., 117, 152.

¹⁸ Ibid., 31. Italics are author's.

¹⁹ Ibid., 42, 307 (note 1). Italics are author's.

²⁰ Ibid., 167.

²¹ Ibid., 20.

²² Ibid., 111,113.

²³ Ibid., 116, 121.

²⁴ Ibid., 45.

²⁵ Ibid., 53.

²⁶ Ibid., 23, 95.

²⁷ Ibid., 303-304. See Endnote 7 to Chapter 10.

²⁸ Harold Warren Lewis, *Why Flip a Coin? The Art and Science of Good Decisions* (New York: J. Wiley and Sons, 1997), 54.

²⁹ Karl Albrecht, *Brain Power: Learn to Improve Your Thinking Skills* (Englewood Cliffs, N.J.: Prentice-Hall, 1980), 31.

³⁰ Ibid., 30.

³¹ Michelene Glaser, Robert Glaser and Robert Chi, *The Nature of Expertise* (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1988), xv, xvii.

³² Craig Loehle, *Thinking Strategically: Power Tools for Personal and Professional Advancement* (New York: Cambridge University Press, 1996), 186.

³³ Albrecht, 43, 61. Italics are author's.

³⁴ John S. Hammond, Ralph L. Keeney and Howard Raiffa, *Smart Choices: A Practical Guide to Making Better Decisions* (Boston, Massachusetts: Harvard Business School Press, 1999), 13.

³⁵ J. Edward Russo and Paul J.H. Shoemaker, *Decision Traps: Ten Barriers to Brilliant Decision-Making and How to Overcome Them* (New York: Simon and Schuster, 1990), xi.

³⁶ Hammond, 7, 47.

³⁷ Stephen Brookfield, *Developing Critical Thinkers: Challenging Adults to Explore Alternative Ways of Thinking and Acting* (San Francisco: Jossey-Bass, 1987), 13.

³⁸ Neal Charness, "Knowledge and Search in Chess," quoted in K. Anders Ericsson, *Toward a General Theory of Expertise: Prospects and Limits* (New York: Cambridge University Press, 1991), 42. Italics are author's.

³⁹ Sources for the remaining decision making theorists who opine about rational choice strategies are as follows (full endnote format is not used here, since it would be prohibitively long. The author and page number are cited—should the reader prefer to locate the source, all of the source reference information is

listed in the Bibliography): Jonathan Baron, 30, 32, 49; Spencer Johnson, Chapter 4; Alfred Richard Oxenfeldt, Chapter 7; David Wendell Miller and Martin K. Starr, 21; J. Edward Russo and Paul J.H. Shoemaker, xvii; Harold Warren Lewis, 2-3; John Eric Adair, 56, 58; Craig Loehle, 186, 187; Paul E. Moody, 1; Herbert S. Kindler, 2, 11-12; W. Edgar Moore, 3-4; Stephen Brookfield, xi, 8; Hyman Ruchlis, 16, 77; Guy A. Hale, 50; Nathan Aaseng, 10; Karl Albrecht, 15, 64, 72, 203, 204.

⁴⁰ Loehle, 2.

⁴¹ Ibid., 5.

⁴² Ibid., 24. Italics are author's.

⁴³ Loehle, 102.

⁴⁴ Ibid., 1.

⁴⁵ Russo, 5.

⁴⁶ Ibid., 105.

⁴⁷ W. Edgar Moore, *Creative and Critical Thinking* (Boston: Houghton Mifflin, 1967), 4.

⁴⁸ Glaser, xviii-xix.

⁴⁹ Loehle, 21.

⁵⁰ Ibid., 186.

⁵¹ Stephen R. Covey, *The 7 Habits of Highly Effective People* (New York: Fireside, 1989), Chapter 1, and Albrecht, 14-15, 42.

⁵² Alfred Richard Oxenfeldt, David Wendell Miller, and Roger A. Dickenson, *A Basic Approach to Executive Decision Making* (New York: AMACOM, 1978), 33-34.

⁵³ Dietrich Doerner and Julia Schoelkopf, "Controlling Complex Systems; or Expertise as Grandmother's Know-How," in K. Anders Ericsson and Jacqui Smith, *Toward a General Theory of Expertise: Prospects and Limits* (New York: Cambridge University Press, 1991), 236.

⁵⁴ See Karl Albrecht, 58; Alfred Richard Oxenfeldt, 7, 43; Moshe F. Rubenstein, 14; and Craig Loehle, 1.

⁵⁵ *The American Heritage Dictionary of the English Language*.

⁵⁶ Weston H. Agor, *The Logic of Intuitive Decision Making* (New York: Quorum Books, 1986), 15.

⁵⁷ Ibid., xiv.

⁵⁸ Philip Goldberg, *The Intuitive Edge: Understanding and Developing Intuition* (Huntington Beach, California: Bookman-Huntington, 1996), 72.

⁵⁹ Ibid., 87.

⁶⁰ Ibid., 49.

⁶¹ Ibid., 37.

⁶² Ibid., 36.

⁶³ Ibid., 19.

⁶⁴ Ibid., 26-27.

⁶⁵ Ibid., 25.

⁶⁶ Ibid., 32.

⁶⁷ Ibid., 104.

⁶⁸ Goldberg is actually traipsing into the field of *creative thinking* here; for additional insight into creative thinking, see Edgar W. Moore, *Creative and Critical Thinking* (Boston: Houghton Mifflin, 1967).

⁶⁹ Goldberg., 34.

⁷⁰ Ibid., 89.

⁷¹ Hyman Ruchlis, Sandra Oddo and Albert Sarney, *Decision Traps: Ten Barriers to Brilliant Decision-Making and How to Overcome Them* (Greenwood, Connecticut: Greenwood Publishing Group, 1999), 33.

⁷² Paul E. Moody, *Decision Making: Proven Methods for Better Decisions* (New York: McGraw-Hill, 1983), 8.

⁷³ Carl Jung, quoted in Isabel Briggs Meyers, *Introduction to Type* (Palo Alto, California: Consulting Psychologists Press, 1980), no page listed, as reflected in Agor, 7.

⁷⁴ Agor, 18.

⁷⁵ For additional views supporting intuition, see Agor, 3; John S. Hammond, 4; Spencer Johnson, 58; and Jonathan Baron, 61.

⁷⁶ A. de Groot, *Thought and Choice in Chess* (The Hague: Moulton Press), no page cited, as quoted in Ericsson and Smith, 10-11.

⁷⁷ Ibid.

⁷⁸ Russo and Shoemaker, 119-120.

⁷⁹ United States Army Field Manual 22-100, *Army Leadership* (Washington D.C.: U.S. Government Printing Office, 1999), 4-8.

⁸⁰ Massimo Piattelli-Palmarini, *Inevitable Illusions: How Mistakes of Reason Rule Our Minds* (New York: J. Wiley and Sons, 1994), 159-160.

⁸¹ Ibid., 19.

⁸² Ibid., 6-7.

⁸³ Ibid., 38-39.

⁸⁴ Ibid., 13.

⁸⁵ Agor, 28.

⁸⁶ Goldberg, 28.

⁸⁷ Moshe F. Rubenstein, *Patterns of Problem Solving* (Englewood Cliffs, N.J.: Prentice-Hall, 1975), 20.

⁸⁸ Sir William Slim, speech to the student body of the Command and General Staff College, Fort Leavenworth, Kansas, given April 8th, 1952. Transcript and video recording found in the Special Holdings section of the Combined Arms Research Library.

⁸⁹ Between May of 1942, after Slim had been forced from Burma, and early 1944, as he prepared to defeat the Japanese at Imphal, Slim was also tangentially involved in operations in the Arakan province of the extreme western portion of Burma. However, during this period, his position and responsibilities were switched several times, to which it is difficult at best to describe his situation, much less analyze what he learned from it. As such, for the purpose of this monograph, this period will not be discussed.

⁹⁰ The British fought with numerous Allied forces during the Burma campaigns, to include Indian and indigenous forces. Although all were instrumental in victory, attempting to maintain the fidelity of nationality is not vital to this monograph. Hereafter, "British forces" implies the Allied forces at large.

⁹¹ Sir William Slim, *Defeat Into Victory* (London: Cassell, 1956), Chapter 1.

⁹² Ronald Lewin, *Slim, the Standard Bearer: A Biography of Field Marshal the Viscount Sir William Slim* (London: Cooper, 1976), 78.

⁹³ Ibid., 80.

⁹⁴ Ibid., 85.

⁹⁵ Slim, *Defeat Into Victory*, 50.

⁹⁶ Lewin, 103.

⁹⁷ Slim, *Defeat Into Victory*, 18.

⁹⁸ Slim, *Defeat Into Victory*, 115-121, and Lewin, 126-127.

⁹⁹ Geoffrey Charles Evans, *Slim as Military Commander* (London: Batsford, 1969), 111, 113.

¹⁰⁰ Slim, *Defeat Into Victory*, 290-295.

¹⁰¹ Lewin, 145.

¹⁰² Michael Hickey, *The Unforgettable Army: Slim's XIVth Army in Burma* (Tunbridge Wells: Spellmount, 1992), 142; and Lewin, 148.

¹⁰³ Evans, 108-109.

¹⁰⁴ Ibid., 107-108.

¹⁰⁵ Ibid., 122-123.

¹⁰⁶ Lewin, 167.

¹⁰⁷ Slim, *Defeat Into Victory*, 367.

¹⁰⁸ Hickey, 146.

¹⁰⁹ Ibid., 180.

¹¹⁰ Hickey, 187.

¹¹¹ Slim, *Defeat Into Victory*, 366.

¹¹² Evans, 176-177.

¹¹³ Ibid., 152.

¹¹⁴ Ibid., 182.

¹¹⁵ Lewin, 200-201.

¹¹⁶ Slim, *Defeat Into Victory*, 393.

¹¹⁷ Lewin, 210-212.

¹¹⁸ Ibid., 222-223.

¹¹⁹ Evans, 212-213.

¹²⁰ Slim, *Defeat Into Victory*, 28.

¹²¹ Lewin, 86.

¹²² Hickey, 150.

¹²³ Slim, *Defeat Into Victory*, 221, 289.

¹²⁴ Ibid., 289.

¹²⁵ Evans, 131-132. See also Lewin, 149.

¹²⁶ Slim, *Defeat Into Victory*, 305.

¹²⁷ Ibid., 347, 351-352.

¹²⁸ Ibid., 343.

¹²⁹ Ibid., 382.

¹³⁰ Lewin, 208-209; and Slim, *Defeat Into Victory*, 390-391.

¹³¹ See the following for further illumination: for the 1942 retreat, Slim, *Defeat Into Victory*, 50; for the Arakan campaign, see *Defeat Into Victory*, 150 and 160-161; for the Imphal-Kohima affair, see *Defeat Into Victory*, 290, and Hickey, 146; and for the Shwebo plain plan, see *Defeat Into Victory*, 393, and Evans, 187.

¹³² Some may assert that Slim did not have the full authority to select his operational objectives, but that they were selected for him by his superior officer Lord Mountbatten, or by the various Allied planning committees. Regardless, Slim intimates that he was in full agreement with most of Mountbatten's ideas, such that any notion would be irrelevant.

¹³³ Slim, speech to CGSC Class.

¹³⁴ Lewin, 176.

¹³⁵ Evans, 106.

¹³⁶ Hickey, 91,93; and Evans, 105.

¹³⁷ Slim, *Defeat Into Victory*, 169-172.

¹³⁸ Lewin, 216-217.

¹³⁹ Slim, *Defeat Into Victory*, 399; and Lewin, 218-219.

¹⁴⁰ Evans, 149; Lewin, 174; and Hickey, 156.

¹⁴¹ Lewin, 193.

¹⁴² Ibid., 157; and Slim, *Defeat Into Victory*, 242.

¹⁴³ Evans, 134-135.

¹⁴⁴ Hickey, 94; and Evans, 134.

¹⁴⁵ Slim, *Defeat Into Victory*, 142-143, 188, 241; and Evans, 91-93.

¹⁴⁶ Ibid., 291.

¹⁴⁷ Ibid., 221. Italics are author's.

¹⁴⁸ Lewin, 203.

¹⁴⁹ Evans, 188.

¹⁵⁰ Slim, *Defeat Into Victory*, 411.

¹⁵¹ Ibid., 209-210.

¹⁵² Stephen Manes, *Gates: How Microsoft's Mogul Reinvented Industry – and Made Himself the Richest Man in America* (New York: Simon and Schuster, 1994), 261.

¹⁵³ Bill Gates, *The Road Ahead* (New York: Wheeler Press, 1995), xiii.

¹⁵⁴ Aaron Boyd, *Smart Money: The Story of Bill Gates* (Greensboro, North Carolina: Morgan Reynolds, 1995), 105; and Adam Woog, *Bill Gates* (San Diego, California: Lucent Books, 1998), 101.

¹⁵⁵ Stuart Crainer and Des Dearlove, *Business the Bill Gates Way: 10 Secrets of the World's Richest Business Leaders* (Oxford: Oxford Center for Innovation, 1999), 10-11.

¹⁵⁶ Janet C. Lowe, *Bill Gates Speaks: Insight from the World's Greatest Entrepreneur* (New York: J. Wiley and Sons, 1998), 31, 45.

¹⁵⁷ Woog, 19.

¹⁵⁸ Ibid., 30.

¹⁵⁹ Ibid., 9.

¹⁶⁰ Ibid., 30.

¹⁶¹ Boyd, 97.

¹⁶² Manes, 252.

¹⁶³ Michael Forman, *Bill Gates: Software Billionaire* (Parsippany, New Jersey: Silver Burdett Press, 1998), 9.

¹⁶⁴ Lowe, 92.

¹⁶⁵ Lowe, xi.

¹⁶⁶ Gates, *The Road Ahead*, 15-16, 17; and Woog, 36.

¹⁶⁷ Gates, *The Road Ahead*, 38.

¹⁶⁸ Woog, 45.

¹⁶⁹ Daniel Ichbiah, *The Making of Microsoft: How Bill Gates and His Team Created the World's Most Successful Software Company* (New York: Prima Publishing, 1992), 25.

¹⁷⁰ Ibid., 26.

¹⁷¹ Manes, 82.

¹⁷² Forman, 40-42.

¹⁷³ Manes, 113.

¹⁷⁴ Forman, 49.

¹⁷⁵ Gates, *The Road Ahead*, 44.

¹⁷⁶ Woog, 67-68.

¹⁷⁷ Manes, 151.

¹⁷⁸ Ralph Zickgraf, *William Gates: From Whiz Kid to Software King* (Ada, Oklahoma: Garrett Educational Corporation, 1992), 27.

¹⁷⁹ Ichbiah, 70.

¹⁸⁰ Zickgraf, 45.

¹⁸¹ Woog, 55.

¹⁸² Manes, 162.

¹⁸³ Joan D. Dickenson, *Bill Gates: Billionaire Computer Genius* (Springfield, New Jersey, 1997), 45.

¹⁸⁴ Crainer, 23.

¹⁸⁵ Ichbiah, 92.

¹⁸⁶ Ichbiah, 93.

¹⁸⁷ Dickenson, 46-47.

¹⁸⁸ Crainer, 24.

¹⁸⁹ Woog, 62-63.

¹⁹⁰ Ibid.

¹⁹¹ Boyd, 72.

¹⁹² Ichbiah, 143.

¹⁹³ Manes, 189.

¹⁹⁴ Ibid., 191.

¹⁹⁵ Ibid., 216-217, 219.

¹⁹⁶ Boyd, 80-81.

¹⁹⁷ Gates, *The Road Ahead*, 53.

¹⁹⁸ Manes, 226.

¹⁹⁹ Ibid., 244.

²⁰⁰ Ibid., 240, 256.

²⁰¹ Woog, 68, and Lowe, 112.

²⁰² Manes, 9, and Dickenson, 64-65.

²⁰³ Ichbiah, 180-181.

²⁰⁴ Zickgraf, 46.

²⁰⁵ Gates, *The Road Ahead*, 39-40.

²⁰⁶ Manes, 68, 153; and Gates, *The Road Ahead*, 14-15.

²⁰⁷ Ibid., 83.

²⁰⁸ Crainer, 115-116.

²⁰⁹ Manes, 204.

²¹⁰ Ibid., 71-72.

²¹¹ Ibid., 160, 163.

²¹² Ibid., 283.

²¹³ Ibid., 288-289.

²¹⁴ Lowe, 24; and Manes, 170, 184-185.

²¹⁵ Crainer, 40.

²¹⁶ Lowe, 72.

²¹⁷ Forman, 48; and Manes, 157.

²¹⁸ Manes, 171-172.

²¹⁹ Crainer, 128-129, 134; and Lowe, 129.

²²⁰ Manes, 241-242.

²²¹ Lowe, 67.

²²² Gates, *The Road Ahead*, 49; and Manes, 95.

²²³ Ibid., 48-49.

²²⁴ Crainer, 30; and Gates, *The Road Ahead*, 50.

²²⁵ Ichbiah, 92.

²²⁶ Manes, 202.

²²⁷ Ibid., 239; and Manes, 128-129.

²²⁸ Gates, *The Road Ahead*, 61.

²²⁹ Lowe, 113-114.

²³⁰ Manes, 221, 226.

²³¹ Ichbiah, 102, and Manes, 183.

²³² Dickenson, 13.

²³³ Manes, 240.

²³⁴ Crainer, 50.

²³⁵ Manes, 264.

²³⁶ Crainer, 79.

²³⁷ Ibid., 80.

²³⁸ Ibid., 120.

²³⁹ Ibid., 152.

²⁴⁰ Eliot A. Cohen and John Gooch, *Military Misfortunes: The Anatomy of Failure in War* (New York: The Free Press, 1990).

²⁴¹ For an interesting discussion of adaptive (versus mechanical) thinkers, see Albrecht, 38-44.

²⁴² Crainer, 110.

²⁴³ Lowe, 54-55, 57, 58, 87.

²⁴⁴ Manes, 184.

²⁴⁵ Lowe., 119.

BIBLIOGRAPHY

Aaseng, Nathan. *You Are the Corporate Executive*. Minneapolis, Minnesota: Oliver Press, 1997.

Adair, John Eric. *Training For Decision*. London: MacDonald, 1971.

Agor, Weston H. *The Logic of Intuitive Decision Making*. New York: Quorum Books, 1986.

Albrecht, Karl. *Brain Power: Learn to Improve Your Thinking Skills*. Englewood Cliffs, N.J.: Prentice-Hall, 1980.

Baron, Jonathan. *Thinking and Deciding*. New York: Cambridge University Press, 1988.

Boyd, Aaron. *Smart Money: The Story of Bill Gates*. Greensboro, North Carolina: Morgan Reynolds, 1995.

Brookfield, Stephen. *Developing Critical Thinkers: Challenging Adults to Explore Alternative Ways of Thinking and Acting*. San Francisco: Jossey-Bass, 1987.

Connelly, Sean. *An Unauthorized Biography (Heineman Profiles)*. Crystal Lake, Illinois: Heineman Library, 1998.

Covey, Stephen R. *The 7 Habits of Highly Effective People*. New York: Fireside, 1989.

Crainer, Stuart and Des Dearlove. *Business the Bill Gates Way: 10 Secrets of the World's Richest Business Leaders*. Oxford, England: Oxford Center for Innovation, 1999.

Dickenson, Joan D. *Bill Gates: Billionaire Computer Genius*. Springfield, New Jersey, 1997.

Doerner, Dietrich. *The Logic of Failure: Why Things Go Wrong and What We Can Do To Make Them Right*. New York: Metropolitan Books, 1996.

Ericsson, K. Anders and Jacqui Smith. *Toward a General Theory of Expertise: Prospects and Limits*. New York: Cambridge University Press, 1991.

Evans, Geoffrey Charles. *Slim as Military Commander*. London: Batsford, 1969.

Forman, Michael. *Bill Gates: Software Billionaire*. Parsippany, New Jersey: Silver Burdett Press, 1998.

Freeman, Arthur M. and Rose DeWolf. *10 Dumbest Mistakes Smart People Make and How to Avoid Them: Simple and Sure Techniques for Gaining Greater Control of Your Life*. New York: Harper Collins, 1992.

Gates, William. *Business at the Speed of Thought: Using a Digital Nervous System*. New York: Warner Books, 1999.

Gates, William. *The Road Ahead*. New York: Wheeler Press, 1995.

Gatlin, Jonathan. *Bill Gates: The Path to the Future*. Philadelphia: Avon Books, 1999.

Glaser, Michelene, Robert Glaser, and Robert Chi. *The Nature of Expertise*. Hillsdale, N.J.: Lawrence Erlbaum Associates, 1988.

Goldberg, Philip. *The Intuitive Edge: Understanding and Developing Intuition*. Huntington Beach, California: Bookman-Huntington, 1996.

Hale, Guy A. *The Leader's Edge: Mastering the Five Skills of Breakthrough Thinking*. Burr Ridge, Illinois: Irwin Professional Publishers, 1996.

Hammond, John S., Ralph L. Keeney, and Howard Raiffa. *Smart Choices: A Practical Guide to Making Better Decisions*. Boston, Massachusetts: Harvard Business School Press, 1999.

Heller, Frank. *Decision Making and Leadership*. New York: Cambridge University Press, 1992.

Hickey, Michael. *The Unforgettable Army: Slim's XIVth Army in Burma*. Tunbridge Wells: Spellmount, 1992.

Ichbiah, Daniel. *The Making of Microsoft: How Bill Gates and His Team Created the World's Most Successful Software Company*. New York: Prima Publishing, 1992.

Johnson, Spencer. *Yes or No: The Guide to Better Decisions*. New York: Harper Collins, 1992.

Kelly, Kevin. *Out of Control*. Menlo Park, California: Addison-Wesley, 1994.

Kindler, Herbert S. *Risk Taking: A Guide for Decision Makers*. Menlo Park, California: Crisp Publications, 1990.

Klein, Gary A. *Sources of Power: How People Make Decisions*. Cambridge, Massachusetts: MIT Press, 1998.

Lewin, Ronald. *Slim, The Standard Bearer: A Biography of Field Marshal the Viscount Sir William Slim*. London: Cooper, 1976.

Lewis, Harold Warren. *Why Flip a Coin? The Art and Science of Good Decisions*. New York: J. Wiley, 1997.

Loehle, Craig. *Thinking Strategically: Power Tools for Personal and Professional Advancement*. New York: Cambridge University Press, 1996.

Lowe, Janet C. *Bill Gates Speaks: Insight from the World's Greatest Entrepreneur*. New York: Wiley, John and Sons, 1998.

Manes, Stephen. *Gates: How Microsoft's Mogul Reinvented an Industry – And Made Himself the Richest Man in America*. New York: Simon and Schuster, 1994.

March, James G., and Chip Heath. *A Primer On Decision Making: How Decisions Happen*. New York: Free Press, 1994.

McIntosh, I.B. *Microman: What Life Might Be Like if You Were Bill Gates*. Milford, Connecticut: Arsenal Publishers, 1998.

Meyers, Chet. *Teaching Students to Think Critically*. San Francisco: Jossey-Bass, 1986.

Mill, John Stuart. *On Liberty*. New York: Crofts, 1947.

Miller, David Wendell, and Martin K. Starr. *The Structure of Human Decisions*. Englewood Cliffs, N.J.: Prentice-Hall, 1967.

Moody, Paul E. *Decision Making: Proven Methods for Better Decisions*. New York: McGraw-Hill, 1983.

Moore, Brooke Noel, and Richard Parker. *Critical Thinking*. Mountain View, California: Mayfield Publishers, 1992.

Moore, Edgar W. *Creative and Critical Thinking*. Boston: Houghton Mifflin, 1967.

Oxenfeldt, Alfred Richard, David Wendell Miller, and Roger A. Dickenson, *A Basic Approach to Executive Decision Making*. New York: AMACOM, 1978.

Paul, Richard, et. al. *Critical Thinking: How to Prepare Students for a Rapidly Changing World*. Santa Rosa, California: Foundation for Critical Thinking, 1993.

Piattelli-Palmarini, Massimo. *Inevitable Illusions: How Mistakes Of Reason Rule Our Minds*. New York: Wiley, 1994.

Plato. *Dialogues of Plato*. New York: Washington Square Press, 1950.

Pridmore, Saxby. *What About Bill Gates?* Boston: Accents Publication Service, 1989.

Rivlin, Gary: *The Plot to Get Bill Gates: An Irreverent Investigation of the World's Richest Man... And the People Who Hate Him*. New York: Times Books, 1999.

Rowan, Roy. *The Intuitive Manager*. Boston: Little and Brown, 1986.

Rubenstein, Moshe F. *Patterns of Problem Solving*. Englewood Cliffs, N.J.: Prentice-Hall, 1975.

Ruchlis, Hyman, Sandra Oddo, and Albert Sarney. *Clear Thinking: A Practical Introduction*. Buffalo, N.Y.: Prometheus Books, 1990.

Russo, J. Edward, and Paul J.H. Shoemaker. *Decision Traps: Ten Barriers to Brilliant Decision-Making and How to Overcome Them*. New York: Simon and Schuster, 1990.

Sanders, Ralph. *The Executive Decisionmaking Process: Identifying Problems and Assessing Outcomes*. Greenwood, Connecticut: Greenwood Publishing Group, 1999.

Senge, Peter M. *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday, 1990.

Slim, William. *Defeat Into Victory*. London: Cassell, 1956.

Slim, William. *Higher Command in War*. Fort Leavenworth, Kansas: U.S. Army Command and General Staff College, 1952.

Slim, William. *Unofficial History*. New York: McKay, 1959.

Stahl, Michael J. *Strategic Executive Decisions*. Greenwood, Connecticut: Greenwood Publishing Group, 1989.

Uhr, Leonard Merrick. *Pattern Recognition, Learning and Thought: Computer-Programmed Models of Higher Mental Processes*. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

United States Army Field Manual 22-100. *Leadership*. Washington D.C.: U.S. Government Printing Office, 1998.

Waldrop, M. Mitchell. *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York: Simon and Schuster, 1992.

Wallace, James, et. al. *Hard Drive: Bill Gates and the Making of the Microsoft Empire*. New York: Wiley, John and Sons, 1992.

Winter, Theresa. *Intuitions: Seeing With the Heart: Finding Answers to the Problems of Life*. Norfolk: Donning Co., 1988.

Woog, Adam. *Bill Gates.*, San Diego, California: Lucent Books, 1998.

Zickgraf, Ralph. *William Gates: From Whiz Kid to Software King.* Ada, Oklahoma: Garrett Educational Corporation , 1992.